DOCUMENT RESUME

ED 063 689 EC 042 081

TITLE	Hearing Levels of Children by Demographic and Socioeconomic Characteristics, United States.
INSTITUTION	National Center for Health Statistics (DHEW), Rockville, Md.
PUB DATE	Feb 72
NOTE	55p.
AVAILABLE FROM	Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 ($0.50)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Auditory Perception; *Childhood; *Demography; National Surveys; Negroes; *Research Projects; *Socioeconomic Background; Statistical Data

ABSTRACT

Reported were estimates of hearing levels of noninstitutionalized children aged 6 to 11 years in the United States in relation to their demographic and socioeconomic background. Findings are results of individual monaural pure-tone air-conduction audiometric tests, conducted as part of the Health Examination Survey of 1963-65. In the survey 7,119 children were examined as representatives of the American child population. Survey findings were limited to test results for the better ear. Detailed statistical results in relation to selected demographic and socioeconomic characteristics were provided in terms of the 1951-American Standard Association reference values. No consistent pattern of differences between white and Negro children was found. White children were found to have better hearing on the average than Negro children at the middle of the test range. In general, children living in the South were found to have somewhat less sensitive hearing, while children from the West had more sensitive hearing. No pattern of differences between urban and rural children was reported. The major significant finding was that hearing sensitivity increased with parent education and family income. (CB)

ED 063689

VITAL and HEALTH STATISTICS
DATA FROM THE NATIONAL HEALTH SURVEY
Series 11- Number 111

EC 042 081

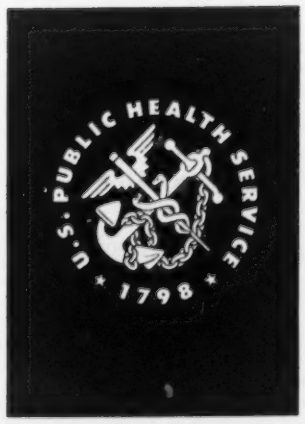
NCHS NATIONAL CENTER FOR HEALTH STATISTICS

Hearing Levels of Children by Demographic and Socioeconomic Characteristics

United States

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Services and Mental Health Administration

Series 11 reports present findings from the National Health Examination Survey, which obtains data through direct examination, tests, and measurements of samples of the U.S. population. Reports 1 through 38 relate to the adult program; additional reports concerning this program are forthcoming and will be numbered consecutively. The present report is one of a number of reports of findings from the children and youth programs, Cycles II and III of the Health Examination Survey. These reports, emanating from the same survey mechanism, are being published in Series 11 but are numbered consecutively beginning with 101. It is hoped this will guide users to the data in which they are interested.



Vital and Health Statistics-Series 11-No. 111

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price 50 cents

Data from the
NATIONAL HEALTH SURVEY

Series 11
Number 111

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Hearing Levels of Children by Demographic and Socioeconomic Characteristics

United States

Hearing levels in the better ear of children 6-11 years of age, by region, race, size of place of residence, grade in school, and selected economically related variables.

DHEW Publication No. (HSM) 72-1025

U.S. DEPARTMENT OF HEALTH,EDUCATION, AND WELFARE
Public Health Service
Health Services and Mental Health Administration
National Center for Health Statistics
Rockville, Md. February 1972

NATIONAL CENTER FOR HEALTH STATISTICS

THEODORE D. WOOLSEY, *Director*

PHILIP S. LAWRENCE, Sc.D., *Associate Director*
OSWALD K. SAGEN, Ph.D., *Assistant Director for Health Statistics Development*
WALT R. SIMMONS, M.A., *Assistant Director for Research and Scientific Development*
JAMES E. KELLY, D.D.S., *Dental Advisor*
EDWARD E. MINTY, *Executive Officer*
ALICE HAYWOOD, *Information Officer*

DIVISION OF HEALTH EXAMINATION STATISTICS

ARTHUR J. McDOWELL, *Director*
PAUL T. BRUYERE, M.D., *Deputy Director*
HENRY W. MILLER, *Chief, Operations and Quality Control Branch*
JEAN ROBERTS, *Chief, Medical Statistics Branch*
PETER V.V. HAMILL, M.D., *Medical Advisor, Children and Youth Program*

COOPERATION OF THE BUREAU OF THE CENSUS

In accordance with specifications established by the National Health Survey, the Bureau of the Census, under a contractual agreement, participated in the design and selection of the sample, and carried out the first stage of the field interviewing and certain parts of the statistical processing.

Vital and Health Statistics-Series 11-No.111

DHEW Publication No. (HSM) 72-1025
Library of Congress Catalog Card Number 76-610281

CONTENTS

Introduction ---------- 1

Hearing Level Measurement---------- 2

Findings ---------- 3
- Race ---------- 3
- Region ---------- 6
- Size of Place of Residence---------- 7
- Family Income---------- 8
- Education of Parent---------- 9
- Grade in School---------- 11

Summary---------- 11

References ---------- 13

List of Detailed Tables---------- 14

Appendix I. Statistical Notes---------- 42
- The Survey Design---------- 42
- Reliability ---------- 42
- Sampling and Measurement Error---------- 43
- Small Categories---------- 45

Appendix II. Demographic and Socioeconomic Variables and Related Terms- 46

Appendix III. Standards for Reference (Audiometric) Zero---------- 47

SYMBOLS	
Data not available	---
Category not applicable	...
Quantity zero	-
Quantity more than 0 but less than 0.05	0.0
Figure does not meet standards of reliability or precision	*

HEARING LEVELS OF CHILDREN
BY DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

Jean Roberts, *Division of Health Examination Statistics*

INTRODUCTION

This is the second report on the hearing levels of children 6-11 years of age in the noninstitutionalized population of the United States based on data obtained by individual pure-tone air-conduction-audiometric testing in the Health Examination Survey of 1963-65. It contains these findings across selected demographic and socioeconomic variables.

The Health Examination Survey is one of the major programs of the National Center for Health Statistics authorized under the National Health Survey Act of 1956 by the 84th Congress as a continuing Public Health Service function to determine the health status of the population.

Three different survey programs are utilized in the National Health Survey.[1] The Health Interview Survey, in which health information is collected from samples of people by household interview, is concerned primarily with the impact of illness and disability within the various population groups. The Health Resources program obtains health data as well as health resource and utilization information through surveys of hospitals, nursing homes, and other resident institutions and the entire range of personnel in the health occupations. The Health Examination Survey, from which the data in this report were obtained, collects health data by direct physical examination, tests, and measurements performed on samples of the population. The latter program provides the best way of obtaining actual diagnostic data on the prevalence of certain medically defined illnesses. It is the only way to secure information on unrecognized and undiagnosed conditions and on a variety of physical, physiological, and psychological measures within the population. It also provides demographic and socioeconomic data on the sample population under study to which the examination findings may be related.

The Health Examination Survey is conducted as a series of separate programs or cycles each of which is limited to some specific segment of the U.S. population and to specific aspects of health. In the first cycle, data were obtained on the prevalence of certain chronic diseases and on the distribution of various physical and physiological measurements for a defined adult population as previously described.[2,3]

For the second cycle or program, on which this report is based, a probability sample of the noninstitutionalized children 6-11 years of age in the United States was selected and examined. The examination primarily assessed health factors related to growth and development. It included an examination by a pediatrician and by a dentist, tests administered by a psychologist, and a variety of tests and measurements by a technician. The survey plan, sample design, examination content, and operation of the survey have been described in a previous report.[4]

Field collection operations for this cycle were started in July 1963 and completed in December 1965. There were 7,119 children examined, or 96 percent of the 7,417 selected in the sample. This national sample is closely

representative of the roughly 24 million noninstitutionalized children 6-11 years of age in the United States with respect to age, sex, race, region, size of place of residence, and rate of population change in size of place of residence from 1950 to 1960.

Each child was given a standardized examination during his single visit by the examining team in the mobile units specially designed for use in the survey. Prior to this examination, information was obtained from the parent of the child. This included demographic and socioeconomic data on household members as well as medical history, behavioral, and related data on the child to be examined. Ancillary data on his grade placement, teacher's ratings of his behavior and adjustment, and health problems known to the teacher were requested from the school attended by the child. Birth certificates for each child were obtained for verification of his age and information related to him at birth.

Members of the Subcommittee on Hearing in Children of the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology—Dr. Raymond E. Jordan, Chairman, Dr. Eldon L. Eagles, Executive Director, and others—were advisors to the Health Examination Survey in the hearing and related ear, nose, and throat parts of the examination.[5] Dr. Leo Doerfler from the University of Pittsburgh was responsible for training the technicians in testing of hearing and Mr. Kenneth Stewart, University of Pittsburgh, for the instrument calibration and environmental control aspects of hearing testing.

Statistical notes on the survey design, reliability of the data, and sampling and measurement error are shown in appendix I. Definitions of the demographic and socioeconomic factors considered here are given in appendix II.

HEARING LEVEL MEASUREMENT

Hearing threshold levels were determined for the right and left ear of each child individually at eight frequencies—250, 500, 1000, 2000, 3000, 4000, 6000, and 8000 cycles per second (cps)—in an acoustically treated room within a specially constructed trailer in the mobile examining center using air-conduction earphones with standard pure-tone audiometers calibrated in accordance with the 1951 American Standard Association specifications, as described previously.[5,6] These instruments were modified by the insertion of a 30-decibel attenuator so that testing could be done to as low as 40 decibels below audiometric zero in a stable part of the range of the instrument. This was done because it was recognized that children's hearing is better than that of adults and would for the majority test below audiometric zero.

Testing was done by technicians specially trained in the use of a modified Hughson-Westlake method in which the tone was introduced first at 60 decibels intensity, decreased by 10 decibel steps until no response was obtained, then increased 5 decibels and dropped 10 decibels until the lowest point was reached at which responses were obtained in 2 out of 3 or 3 out of 5 ascending trials. Hearing thresholds so determined were those corresponding to the weakest intensity of pure tone produced in the audiometer earphone that is just audible to the ear of the examinee in the specified number of trials.

Performance of the room in attenuating external noise was determined by acoustical surveys conducted under normal test conditions periodically throughout the cycle. These survey findings, when compared with American Standards criteria for background noise, indicated that the environment was adequate for testing without masking to about 20 decibels below audiometric zero (re ASA-1951) at 250 cps, 28-35 decibels below at 500-2000 cps, and 40 decibels below from 3000-8000 cps.[7] Analysis of the test results indicates no real evidence of masking from external noise at frequencies lower than 3000 cps. Quality of the test results was further controlled by daily and weekly field checks and monthly calibration of the audiometers in the Acoustics Laboratory of the University of Pittsburgh.

During the hearing test when the child seemed too fatigued to give reliable responses, the frequencies of 3000 and 8000 cps were omitted. Because the extent of missing data at these two frequencies for the youngest children (6 and 7 years old) was very large, the national estimates shown for them will be less reliable than for the others, as previously described.[5]

Findings from the survey in this report are presented in terms of the 1951 American Standard for Audiometric Zero. The basis for converting these findings to those in terms of the 1964 standard reference zero recommended by the International Organization for Standardization and recently adopted in the 1969 American National Standard for audiometers is given in appendix III.

With modified audiometers used in this study it was possible to obtain reliable estimates of essentially the entire range of hearing thresholds at each frequency. Mean and median values with few exceptions do not differ significantly, mean values usually being slightly higher (poorer hearing) than the medians. Thus the thresholds among at least the larger subgroups of these children appear in general to be fairly symmetrically distributed. For convenience, findings are presented in this report in terms of mean hearing levels across all demographic and socioeconomic characteristics. Hearing levels at three percentile points— P_{25}, P_{50}, and P_{75} or the levels below which 25 percent, 50 percent, and 75 percent of the child population fall, respectively—are included for the two major racial groups, the four regions, and the various income classes to give some measure of the variation in thresholds within the child population.

FINDINGS

Only key measures of functional hearing—thresholds in the better ear and estimates for speech based on them—are considered here in relation to the demographic and socioeconomic background of these children.

Hearing of children tends to be less sensitive (poorer) at the higher frequencies from 3000 to 8000 cycles per second than at the lower tones from 250 to 2000 cps[5] (figure 1 and table 1). Mean thresholds, in terms of the 1951 ASA standard for reference zero, were as expected all significantly below (better than) what was considered normal hearing in that standard which had been based on findings among adults primarily. The mean values (re 1951-ASA reference or audiometric zero) ranged from a low of -9.5 decibels at 250 cps to -2.0 decibels at 4000 cps. In terms of the 1964-ISO standard for reference on audiometric zero (appendix III), except at 2000 cps these mean hearing thresholds are consistently less sensitive (poorer) than the levels considered normal in the newer standard, ranging from 2.2 decibels at 1000 cps to 6.9 decibels at 6000 cps. Only at 2000 cps do mean hearing thresholds of children remain (slightly) below or more sensitive than the new "normal" values. The decrease in relative hearing sensitivity with frequency from 2000 cps on persists even in relation to the new standard.

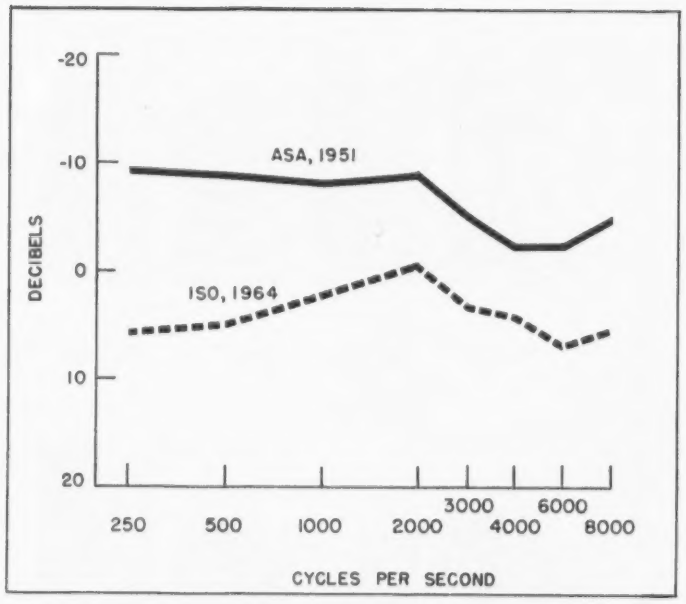


Figure 1. Mean hearing levels of children 6-11 years of age at eight frequencies in terms of decibels re audiometric zero—ASA 1951 and ISO 1964, United States, 1963-65.

Race

White children on the average had better hearing than Negro children in the middle frequencies from 1000 to 4000 cps, mean differences being large enough to be statistically significant only at 3000 and 4000 cps (figure 2 and tables 2 and 3). At the extremes of the frequency range, 250-500 and 6000-8000 cps, Negro children tended to have just slightly more sensitive hearing than white. This pattern generally persisted throughout the age range but mean differences were not consistently significant throughout. Mean levels for the other races are also shown in table 1, but the sample used in this study was not large enough to provide reliable national

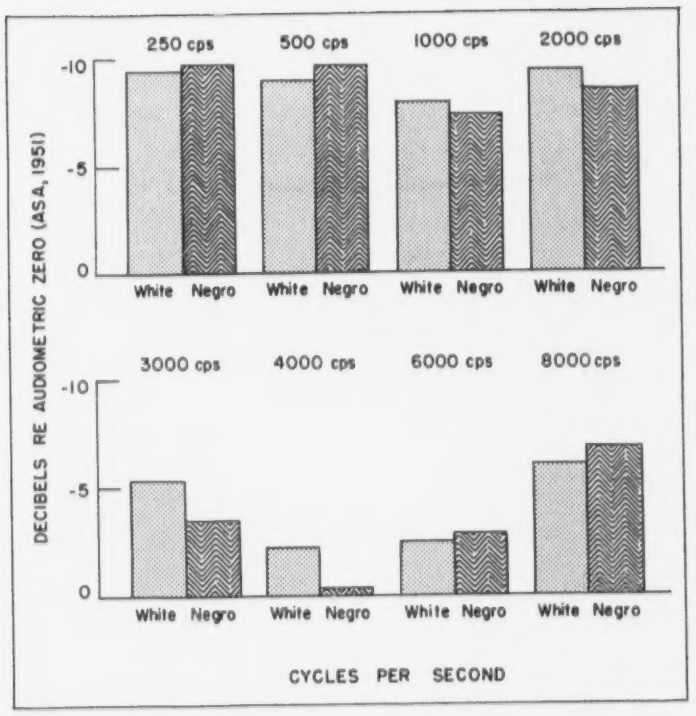


Figure 2. Mean hearing levels of white and Negro children 6-11 years of age at eight frequencies, United States, 1963-65.

estimates for this small heterogeneous group in the population.

Negro boys show a similar pattern to that for the total group but mean Negro-white differences in levels are large enough to be statistically significant at 250-500 cps (Negro—more sensitive) and at 3000-4000 cps (Negro—less sensitive). Among girls, the Negro group generally had poorer hearing than did the white except at 8000 cps.

Further quantitative evidence of the lack of any consistent racial differentials among children in hearing sensitivity was obtained for convenience by use of simple linear correlation techniques where race is treated as a binomial variate (excluding the less than 1 percent not classified as white or Negro). At the essential speech frequencies (average of 500, 1000, and 2000 cps) a negligible relationship was found between hearing thresholds and race ($r=.01\pm.031$).

Hearing sensitivity among both Negro and white children increased with age throughout the frequency range in the study, mean differences

Table A. Mean, median, and semi-interquartile range in the distribution of hearing thresholds of white and Negro children 6-11 years of age at eight frequencies: United States, 1963-65

Frequency	White			Negro		
	Mean	Median	$1/2(P_{75}-P_{25})$	Mean	Median	$1/2(P_{75}-P_{25})$
	Decibels re audiometric zero (ASA-1951)					
250 cps	-9.4	-9.8	3.8	-9.7	-9.9	3.7
500 cps	-8.9	-9.3	3.8	-9.6	-9.8	3.8
1000 cps	-7.9	-8.7	4.2	-7.3	-8.3	4.3
2000 cps	-9.3	-9.6	3.8	-8.4	-8.9	3.9
3000 cps	-5.3	-5.9	5.4	-3.5	-3.5	5.4
4000 cps	-2.3	-2.4	5.4	-0.4	-0.4	4.0
6000 cps	-2.5	-2.9	6.0	-2.9	-3.2	5.9
8000 cps	-6.0	-7.1	5.9	-6.8	-7.6	5.4

NOTE: Semi-interquartile range $1/2(P_{75}-P_{25})$ which includes 12.5 percent of the distribution above and 12.5 percent below the median (P_{50}).

between hearing levels for 6- and 11-year-olds being large enough to be statistically significant only at the lower tones from 250-1000 cps and at the highest frequency, 8000 cps. The fact that the mean levels decreased slowly but consistently with each year of age over the entire age span to 10 or 11 years would probably indicate that this increasing sensitivity is due to some factors other than the shorter attention span and hence somewhat less reliable test results among the 6- and 7-year-old children.

The semi-interquartile range in the distribution of hearing levels, half of the range between the 25th and 75th percentile points and hence includes 25 percent of the children, gives a rough measure of the variation in hearing sensitivity among them. As may be seen in tables A, 2, and 3, this semi-interquartile range is similar for both racial groups. It is generally lower at frequencies of 2000 cps or below (7 to 9 decibels) than at the high tonal frequencies of 3000 cps and over (11 to 12 decibels).

Findings from the 1958-60 study conducted by the University of Pittsburgh-Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology among a

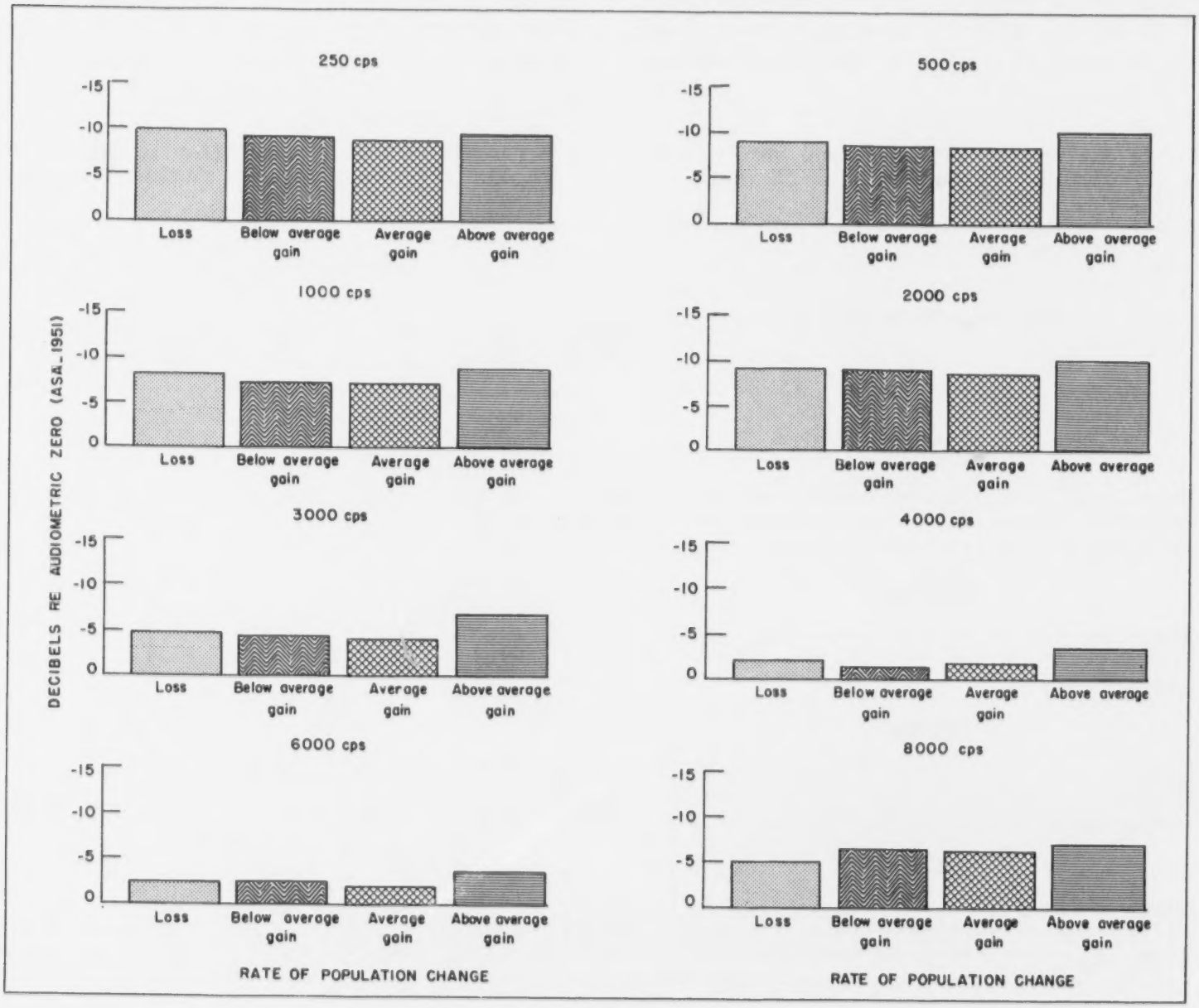


Figure 3. Mean hearing levels of children 6-11 years of age at eight frequencies by region, United States, 1963-65.

representative sample of over 4,000 children between the ages of 5 and 14 years in the Pittsburgh, Pennsylvania, schools showed only small white-nonwhite differences in hearing sensitivity and no consistent trend.[8] For the right ear, slightly but not significantly better hearing was found among nonwhite than white children at 250, 500, 6000, and 8000 cps and slightly poorer hearing at 2000-4000 cps, on the average, a different pattern than that for the left ear, where mean thresholds for the nonwhite group were slightly lower at all but 2000 cps. The findings from the present study for the better ear are in general somewhat similar to those for the right ear of children in the Pittsburgh group. However, the latter includes children of 5 and 12-14 years of age not in the present national study, and the nonwhite group from Pittsburgh includes both Negroes and other nonwhite children limiting precise comparison.

Region

Children from the South were found to have less sensitive hearing on the average than those from other regions except at 6000 and 8000 cps, where mean scores of children from the Northeast were higher (poorer hearing) (figure 3 and table 4). Children from the West had more sensitive hearing than those from other regions except at 4000 and 8000 cps, where the Midwest group had somewhat lower mean levels. Mean differences between the Western and Southern residents were large enough to be statistically

Table B. Mean, median, and semi-interquartile range in the distribution of hearing thresholds of children 6-11 years of age at six frequencies, by region: United States, 1963-65

Region and measure	Frequency					
	250 cps	500 cps	1000 cps	2000 cps	4000 cps	8000 cps
	Decibels re audiometric zero (ASA-1951)					
Northeast						
Mean	-9.4	-9.0	-7.3	-9.0	-2.0	-5.1
Median	-9.7	-9.4	-8.2	-9.5	-5.7	-6.3
$1/2(P_{75}-P_{25})$	3.8	4.0	4.7	4.0	5.5	6.0
Midwest						
Mean	-9.1	-8.8	-8.0	-9.0	-2.7	-7.3
Median	-9.4	-9.2	-8.7	-9.3	-2.4	-8.2
$1/2(P_{75}-P_{25})$	3.6	3.7	3.7	3.8	5.4	5.6
South						
Mean	-8.7	-8.0	-7.1	-8.5	-1.0	-5.2
Median	-9.3	-8.7	-8.1	-9.1	-1.2	-6.5
$1/2(P_{75}-P_{25})$	3.6	4.0	4.5	3.6	4.6	6.0
West						
Mean	-10.8	-10.0	-8.8	-10.1	-2.4	-6.5
Median	-11.0	-10.2	-9.2	-10.3	-2.6	-7.5
$1/2(P_{75}-P_{25})$	4.5	4.3	4.2	4.0	5.6	5.6

NOTE: Semi-interquartile range $1/2(P_{75}-P_{25})$ which includes 12.5 percent of the distribution above and 12.5 percent below the median (P_{50}).

significant at the lower frequencies of 3000 cps or less.

Both boys and girls from the West had lower mean hearing levels (better hearing) than those from other regions except at the 4000 and 8000 cps frequencies. However, at the other extreme, girls from the South were found to have poorer hearing than those from other sections of the country across the entire test range, while boys from the South had the poorest hearing (mean values) only at 2000-6000 cps.

By age the regional pattern was similar but less distinct than that for the total group of children 6-11 years.

The consistency of the pattern of regional differences in hearing sensitivity of children was tested very roughly using linear correlation techniques. Here a negligible relationship was found with $r=-.07\pm.040$.

As may be seen in tables B and 5-8, variability in hearing levels as measured by the semi-interquartile range is consistently slightly higher among children from the West than for those living elsewhere except at 1000 cps and the two highest frequencies. In all four regions variability at test tones of 3000 cps or more is greater than at the lower tones.

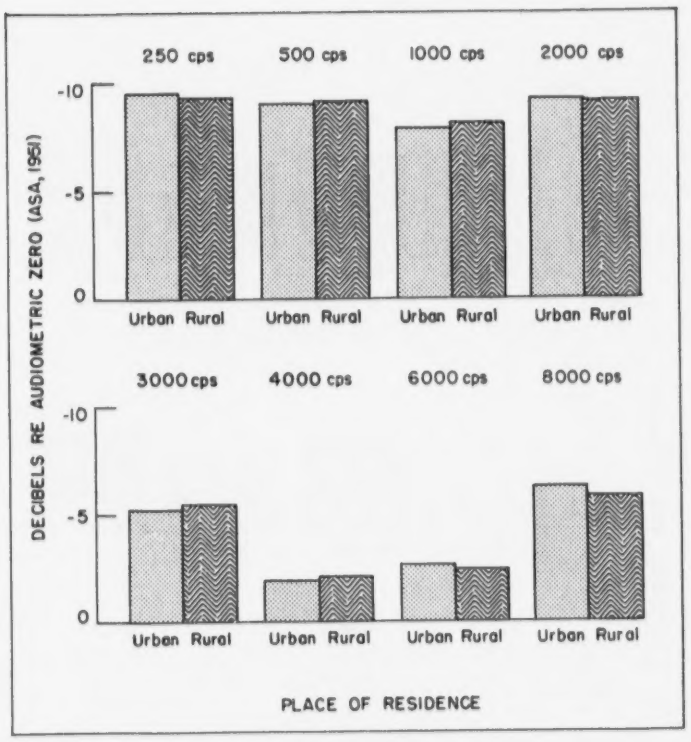


Figure 4. Mean hearing levels of urban and rural children 6-11 years of age at eight frequencies, United States, 1963-65.

Size of Place of Residence

Children living in urban communities not differentiated by size of place have hearing thresholds that differ little on the average from those living in rural areas of the country (tables 9 and 10 and figure 4). At frequencies of 250, 2000, 6000, and 8000 cps urban dwellers have slightly more sensitive hearing than their rural counterparts on the average, while rural residents have slightly better hearing at 500, 1000, 3000, and 4000 cps. However, none of the mean differences are large enough to be considered statistically significant.

Hearing levels did not vary consistently with size of community for urban dwellers. Mean thresholds for the essential speech range varied from a low of -9.4 dB (re audiometric zero-ASA, 1951) for children in urban places of 2,500 to 9,999 total population to -8.3 dB for those in places of 25,000 or more population but living outside the large urbanized areas (table 11), differences which could easily be due to sampling variability. The degree of association between hearing thresholds (estimates for speech) and size of place of residence is, as expected, negligible ($r=.02\pm.037$).

Rate of Population Change.—The extent and direction of change in size of population of place of residence from 1950 to 1960 was one of the three axes of stratification used in the sampling frame for this survey. It is considered to be an index to the economic stability of the communities in which these children reside. Places in which there was an above-average gain during the decade were perhaps more likely to have a healthy expanding economy, while those experiencing a loss might tend to be communities with diminishing employment opportunities and resources for development. It might be expected that this factor would in turn be reflected to some extent in the hearing sensitivity of the children living there insofar as this might be affected by the availability and adequacy of medical care.

No significant pattern of relationship exists between hearing sensitivity of children and this index of economic stability of their community

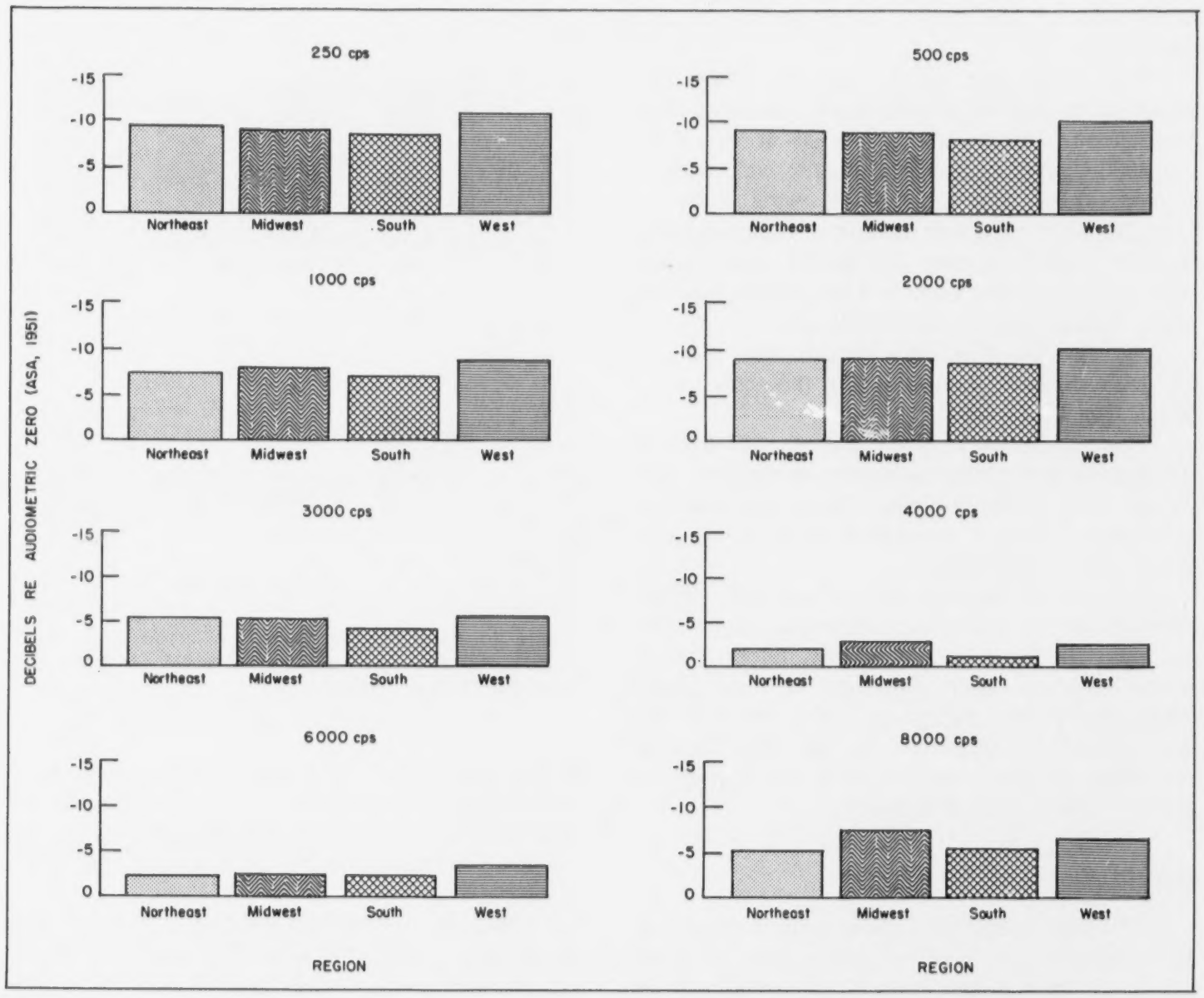


Figure 5. Mean hearing levels of children 6-11 years of age at eight frequencies by rate of population change in place of residence from 1950 to 1960, United States, 1963-65.

of residence. Children living in places showing an above-average gain in size tend to have slightly but not significantly better hearing than those from presumably less prosperous areas throughout the test range with the slight exception at the lowest frequency (figure 5 and table 12). Those in areas of population loss except at the highest frequency (8000 cps) generally have at least as good or slightly more sensitive hearing on the average than those from areas showing moderate growth.

Family Income

Hearing sensitivity of children generally increased with the size of their family's annual income consistently throughout the test range in this study (table 13 and figure 6). Mean thresholds for those in the lowest income bracket, less than $3,000, were significantly higher (poorer hearing) than those from families with earnings of $10,000 or $15,000 or more. Successive differences from one income bracket to the next

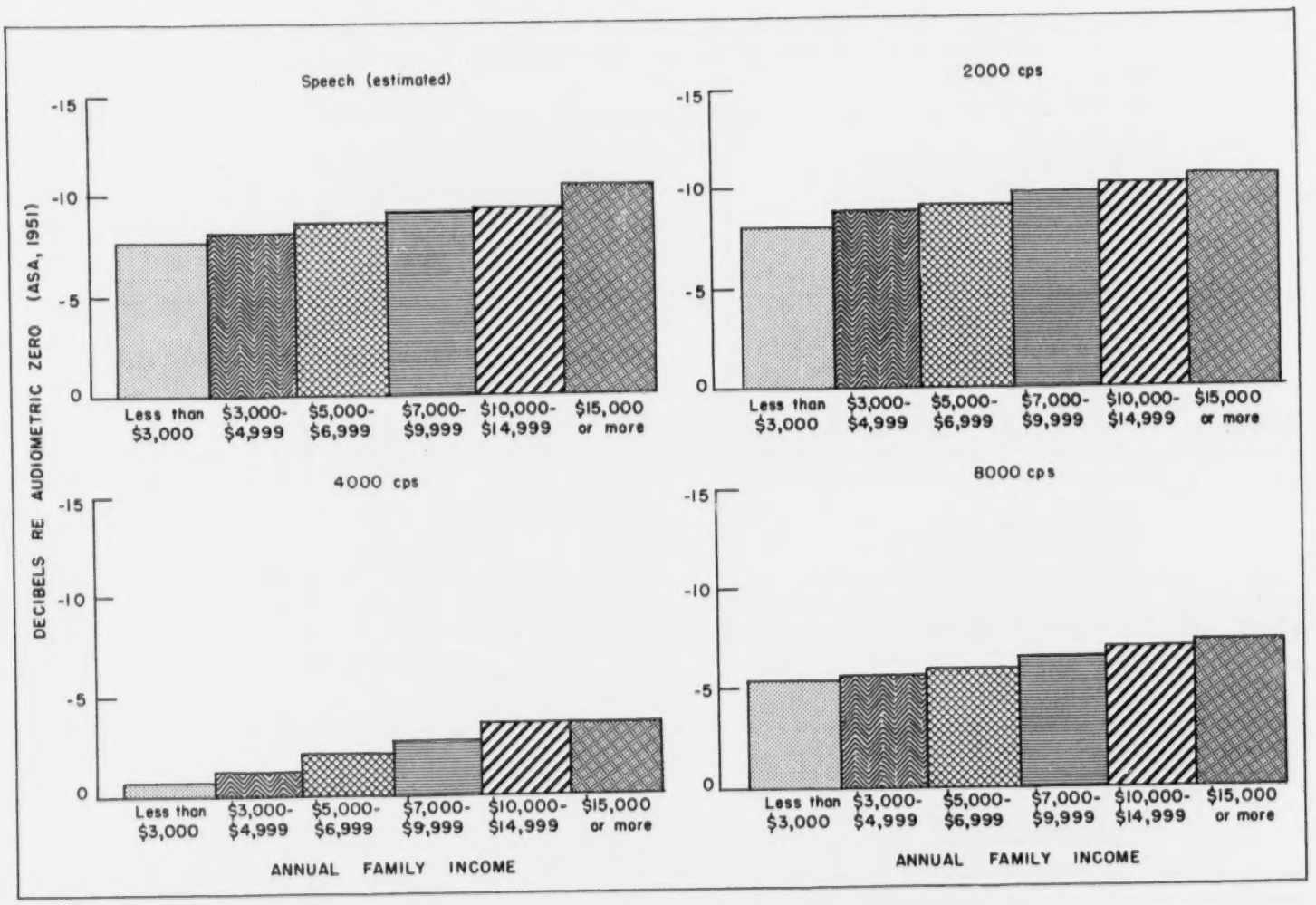


Figure 6. Mean hearing levels of children 6-11 years of age at selected frequencies by annual family income, United States, 1963-65.

highest were generally not large enough, however, to be considered statistically significant. The degree of association for the total group 6-11 years of age at the speech levels was found to be significant but of a low order ($r=.12\pm.018$).

This pattern of relationship of hearing sensitivity with size of family is found among both boys and girls and at each year of age with few exceptions.

At frequencies above 250 cps, girls were found to have slightly more sensitive hearing than boys, on the average, with few exceptions across all income levels.

Variability in hearing sensitivity as measured by the semi-interquartile range showed no consistent pattern of relationship to family income for these children (tables C, 14, and 15).

Education of Parent

Hearing sensitivity of children on the average was found to increase with the number of years of formal schooling completed by the parent who was considered head of the household (table 16 and figure 7). Mean differences between hearing thresholds of those whose parents had the least education and those with 4 years or more of college work were statistically significant throughout the entire test range of frequencies. However, differences between successive educational levels of parent were not generally large enough to be significant, and occasional slight deviations from the general pattern were found, particularly for the substantially smaller group at the 8-year level.

Table C. Mean, median, and semi-interquartile range in the distribution of hearing thresholds of children 6-11 years of age at six frequencies, by annual family income: United States, 1963-65

Family income and measure	Frequency					
	250 cps	500 cps	1000 cps	2000 cps	4000 cps	8000 cps
Less than $3,000	Decibels re audiometric zero (ASA-1951)					
Mean	-8.8	-8.1	-6.9	-8.0	-0.7	-5.4
Median	-9.3	-8.8	-8.0	-8.7	-0.8	-6.4
$1/2(P_{75} - P_{25})$	3.8	4.2	4.8	4.0	4.4	5.9
$3,000-$4,999						
Mean	-9.1	-8.6	-7.4	-8.8	-1.2	-5.6
Median	-9.5	-8.9	-8.2	-9.3	-1.0	-6.7
$1/2(P_{75} - P_{25})$	3.8	4.2	4.7	3.9	4.8	6.0
$5,000-$6,999						
Mean	-9.4	-9.0	-7.8	-9.1	-2.1	-5.9
Median	-9.7	-9.4	-8.7	-9.6	-2.3	-7.1
$1/2(P_{75} - P_{25})$	3.8	3.9	4.2	3.8	5.3	6.0
$7,000-$9,999						
Mean	-10.1	-9.6	-8.2	-9.7	-2.7	-6.5
Median	-10.2	-9.7	-8.9	-9.9	-2.8	-7.7
$1/2(P_{75} - P_{25})$	3.8	3.8	3.7	3.6	5.4	5.6
$10,000-$14,999						
Mean	-10.0	-9.4	-8.5	-10.1	-3.6	-6.9
Median	-10.1	-9.6	-9.1	-10.1	-3.7	-8.0
$1/2(P_{75} - P_{25})$	3.7	4.0	3.8	3.8	5.6	5.4
$15,000 or more						
Mean	-10.7	-10.6	-10.0	-10.5	-3.6	-7.2
Median	-10.5	-10.5	-9.9	-10.6	-3.9	-8.2
$1/2(P_{75} - P_{25})$	3.8	4.0	4.0	4.0	5.4	5.5

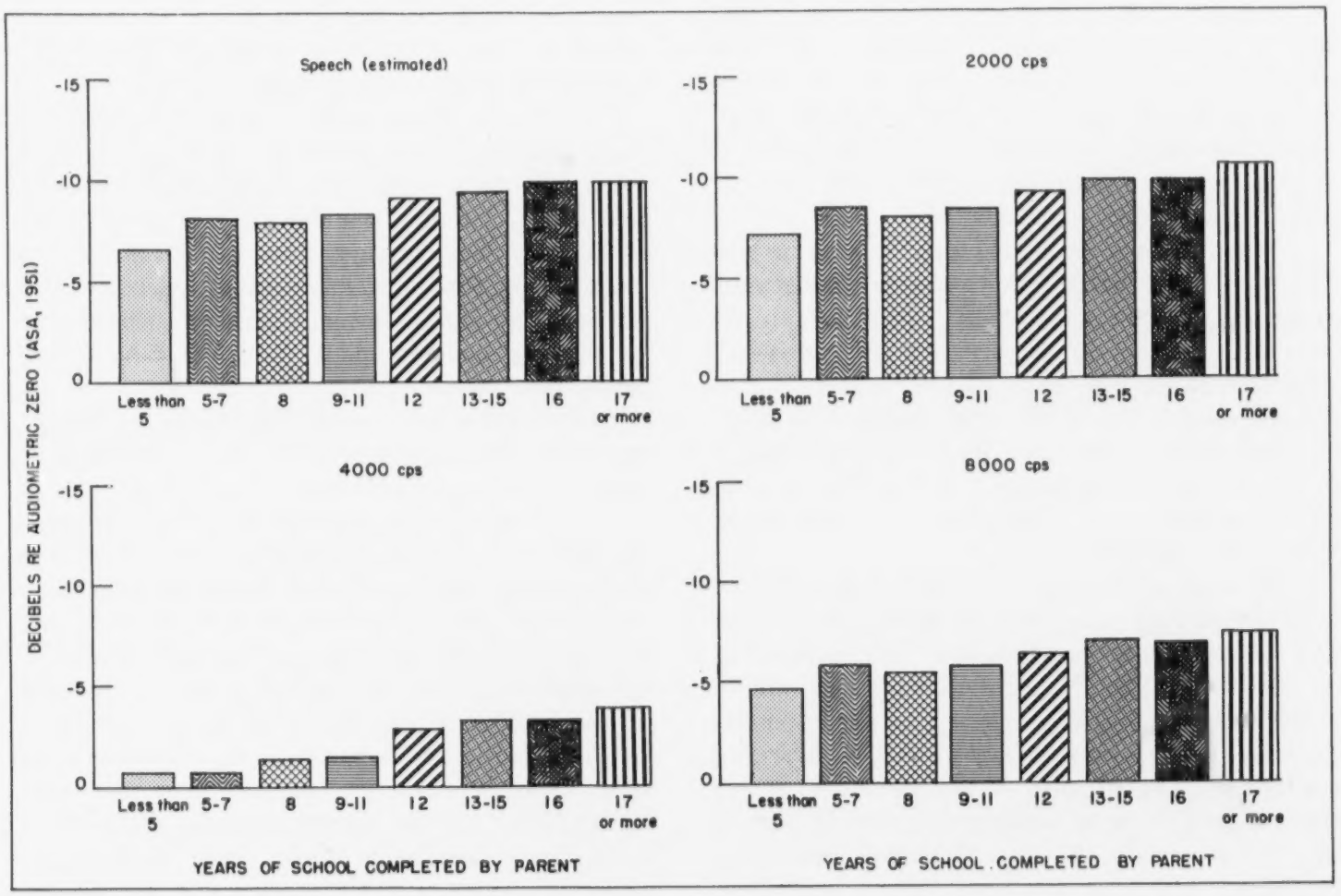


Figure 7. Mean hearing levels of children 6-11 years of age at selected frequencies by education of parent, United States, 1963-65.

The negative relationship between hearing levels of children and education of their parents (hearing sensitivity increasing with education) was slightly stronger than that with income ($r=.14 \pm .025$). Even when the income level of the family is held constant, since a relatively high correlation exists between income and education ($r=.58$), there is still a small but significant negative relationship of hearing sensitivity with education of parent ($r=-.09$) although it has been reduced by about one-third.

Grade in School

Mean hearing thresholds as shown in table 17 show a similar pattern of increasing sensitivity with grade to that with age of the child as would be expected since the majority of children are in the normal grade placement for their age. Since the age range in this survey was 6-11 years, children in the kindergarten or seventh grade at the time of the examination are relatively smaller groups and cannot be considered typical of either the total or normal group of children in these two grades. The hearing test findings, however, should be closely representative of noninstitutionalized children in grades 1-6.

SUMMARY

This report contains estimates of the hearing levels of noninstitutionalized children 6-11 years of age in the United States in relation to their demographic and socioeconomic background. The findings are based on individual monaural pure-tone air-conduction audiometric test results for examinees in the Health Examination Survey of 1963-65. In the survey, a probability sample of 7,417 children was selected to represent the

24 million noninstitutionalized children of this age in the United States. Of these, the 7,119 examined, or 96 percent, were closely representative of the American child population from which the sample was drawn with respect to age, sex, race, region, and other available demographic and socioeconomic variables.

Findings in this report are limited to test results for the better ear. Comparisons between mean thresholds in decibels based on both the 1951-ASA audiometric zero and the 1964-ISO audiometric zero at each of the eight test frequencies—250, 500, 1000, 2000, 3000, 4000, 6000, and 8000 cps—are included. The results in relation to the selected demographic and socioeconomic characteristics are presented in terms of the 1951-ASA reference values.

No consistent pattern of white-Negro differences in hearing sensitivity of American children was found. White children had better hearing on the average than Negro children at the middle of the test range—1000-4000 cycles per second—but only at 3000 and 4000 cps was the difference statistically significant. At the extremes of the test range the racial differences were negligible but in the opposite direction. Hearing sensitivity increased with age for both Negro and white children up to 10 or 11 years. The degree of variability among children in this faculty was also similar for both racial groups.

Children living in the South were found to have somewhat less sensitive hearing, except at 6000 and 8000 cps, while those from the West had more sensitive hearing, except at 4000 and 8000 cps, than children from other sections of the country. However, the mean differences were statistically significant only between the extremes of the regional groups at the lower frequencies under 4000 cps.

No real urban-rural differences or differences in size of urban place of residence were found among these children.

The only really significant pattern of relationships of hearing sensitivity of children to these demographic and socioeconomic characteristics was with education of their parents and income of their families. Hearing sensitivity increased with the amount of formal schooling of their parents and also with the income level of their families. The association with education was slightly stronger ($r=-.14$) than that with income ($r=-.12$), but significant mean differences in hearing thresholds were found between the extreme groups in both factors.

REFERENCES

[1]National Center for Health Statistics: Origin, program and operation of the U.S. National Health Survey. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 1-No. 1. Public Health Service. Washington. U.S. Government Printing Office, Aug. 1963.

[2]National Center for Health Statistics: Plan and initial program of the Health Examination Survey. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 1-No. 4. Public Health Service. Washington. U.S. Government Printing Office, July 1965.

[3]National Center for Health Statistics: Cycle I of the Health Examination Survey, sample and response, United States, 1960-1962. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 11-No. 1. Public Health Service. Washington. U.S. Government Printing Office, Apr. 1964.

[4]National Center for Health Statistics: Plan, operation, and response results of a program of children's examinations. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 1-No. 5. Public Health Service. Washington. U.S. Government Printing Office, Oct. 1967.

[5]National Center for Health Statistics: Hearing levels of children by age and sex, United States. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 11-No. 102. Public Health Service. Washington. U.S. Government Printing Office, Feb. 1970.

[6]American Standards Association: *American Standard Specifications for Audiometers for General Diagnostic Purposes.* Pub.No. Z24.5-1951. New York, 1951.

[7]American Standards Association: *American Standard Criteria for Background Noise in Audiometer Rooms.* Pub.No. S3.1-1960. New York, 1960.

[8]Eagles, E.L., et al: Hearing sensitivity and related factors in children. *Laryngoscope.* June 1963.

[9]Burkhard, M.D., and Corliss, E.L.R.: The response of earphones in ears and couplers. *J.Acoust.Soc.Amer.* 26(5):679-685, Sept. 1954.

[10]Corliss, E.L.R., and Burkhard, M.D.: A probe tube method for transfer of threshold standards between audiometer earphones. *J.Acoust. Soc.Amer.* 25(5):990-993, Sept. 1963.

[11]National Center for Health Statistics: Loudness balance study of selected audiometer earphones. *Vital and Health Statistics.* PHS Pub. No. 1000-Series 2-No. 40. Public Health Service. Washington. U.S. Government Printing Office, Dec. 1970.

[12]Davis, H., and Kranz, F.W.: The international standard reference zero for pure-tone audiometers and its relation to the evaluation of impairment of hearing. *J. Speech Hear. Res.* 7(1):7-16, Mar. 1964.

[13]International Organization for Standardization: *ISO Recommendation R 389-Standard Reference Zero for the Calibration of Pure Tone Audiometers.* ISO/R 389-1964(E). Switzerland, Nov. 1964.

[14]Davis H.: The ISO zero-reference level for audiometers. *Arch.Otolaryng.* 81:145-199, Feb. 1965.

[15]Glorig, A.: Audiometric reference levels. *Laryngoscope* 76:842-849, May 1966.

[16]Weissler, P.: International standard reference zero for audiometers. *J.Acoust.Soc.Amer.* 44(1):264-275, July 1968.

[17]British Standards Institution: *British Standard Specification for the Normal Threshold of Hearing for Pure Tones by Earphone Listening.* B.S. 2497. London. British Standards House, Inc., 1954.

———○○○———

LIST OF DETAILED TABLES

		Page
Table 1.	Mean hearing levels at eight frequencies and estimates for speech of children, by race, age, and sex: United States, 1963-65	15
2.	Medians and quartile points in the distribution of hearing levels at eight frequencies and estimates for speech among white children, by age and sex: United States, 1963-65	17
3.	Medians and quartile points in the distribution of hearing levels at eight frequencies and estimates for speech among Negro children, by age and sex: United States, 1963-65	19
4.	Mean hearing levels at eight frequencies and estimates for speech of children, by region, age, and sex: United States, 1963-65	21
5.	Medians and quartile points in the distribution of hearing levels at eight frequencies and estimates for speech among children in the Northeast, by age and sex: United States, 1963-65	23
6.	Medians and quartile points in the distribution of hearing levels at eight frequencies and estimates for speech among children in the Midwest, by age and sex: United States, 1963-65	25
7.	Medians and quartile points in the distribution of hearing levels at eight frequencies and estimates for speech among children in the South, by age and sex: United States, 1963-65	27
8.	Medians and quartile points in the distribution of hearing levels at eight frequencies and estimates for speech among children in the West, by age and sex: United States, 1963-65	29
9.	Mean hearing levels at eight frequencies and estimates for speech of children living in urban communities, by age and sex: United States, 1963-65	31
10.	Mean hearing levels at eight frequencies and estimates for speech of children living in rural areas, by age and sex: United States, 1963-65	32
11.	Mean hearing levels for speech (estimated) of children living in urban communities, by size of place of residence, age, and sex: United States, 1963-65	33
12.	Mean hearing levels at eight frequencies and estimates for speech of children, by rate of population change in place of residence from 1950 to 1960 and age: United States, 1963-65	34
13.	Mean hearing levels for speech (estimated) and at 2000, 4000, and 8000 cycles per second for children, by annual family income and age: United States, 1963-65	35
14.	Medians and quartile points in the distribution of hearing levels at eight frequencies among children, by annual family income, and age: United States, 1963-65	36
15.	Medians and quartile points in the distribution of hearing levels for speech among children, by annual family income, age, and sex: United States, 1963-65	38
16.	Mean hearing levels for speech (estimated) and at 2000, 4000, and 8000 cycles per second of children, by education of parent and age: United States, 1963-65	40
17.	Mean hearing levels at eight frequencies and estimates for speech of children 6-11 years of age, by grade in school: United States, 1963-65	41

Table 1. Mean hearing levels at eight frequencies and estimates for speech of children, by race, age, and sex: United States, 1963-65

Age and sex	250 cps				500 cps				1000 cps			
	Total	White	Negro	Other races	Total	White	Negro	Other races	Total	White	Negro	Other races
	Decibels re audiometric zero (ASA-1951)											
Both sexes												
6-11 years	-9.5	-9.4	-9.7	-13.3	-9.0	-8.9	-9.6	-10.4	-7.8	-7.9	-7.3	-9.6
6 years	-7.4	-7.2	-8.0	-10.8	-7.2	-7.0	-8.2	-5.3	-6.6	-6.6	-6.2	-6.1
7 years	-8.2	-8.3	-7.9	-9.0	-7.6	-7.4	-8.0	-11.0	-6.9	-6.8	-6.8	-8.4
8 years	-9.8	-9.8	-9.7	-11.2	-9.1	-9.0	-9.4	-5.0	-7.5	-7.6	-6.5	-7.5
9 years	-9.8	-9.7	-10.0	-12.2	-9.2	-9.1	-9.6	-13.0	-8.0	-8.1	-7.3	-9.4
10 years	-10.8	-10.8	-10.8	-15.0	-10.4	-10.4	-10.2	-10.8	-9.0	-9.1	-7.5	-15.0
11 years	-11.0	-10.8	-11.8	-13.1	-10.4	-10.2	-11.7	-4.6	-9.1	-9.1	-8.8	-2.8
Boys												
6-11 years	-9.8	-9.6	-10.7	-14.4	-8.8	-8.6	-10.0	-11.0	-7.6	-7.6	-7.2	-10.5
6 years	-7.6	-7.4	-8.9	-12.5	-7.0	-6.7	-9.2	-6.9	-6.4	-6.3	-6.3	-8.4
7 years	-8.6	-8.6	-8.2	-9.6	-7.4	-7.3	-8.0	-14.6	-6.6	-6.6	-6.5	-11.8
8 years	-9.8	-9.6	-10.6	-12.5	-8.5	-8.4	-9.2	-2.5	-7.0	-7.1	-6.3	-7.5
9 years	-10.4	-10.2	-11.6	-11.8	-9.6	-9.4	-10.4	-11.2	-8.4	-8.3	-8.4	-7.5
10 years	-11.2	-11.0	-12.3	-22.5	-10.2	-10.0	-11.3	-17.5	-8.6	-8.8	-7.1	-22.5
11 years	-11.4	-11.2	-13.0	-19.4	-10.6	-10.3	-12.2	-13.4	-9.0	-9.0	-8.8	-8.2
Girls												
6-11 years	-9.2	-9.2	-8.8	-12.4	-9.1	-9.1	-9.2	-9.9	-8.1	-8.2	-7.3	-9.0
6 years	-7.2	-7.2	-7.4	-12.0	-7.4	-7.4	-7.4	-7.0	-7.0	-7.0	-6.4	-7.5
7 years	-8.0	-8.0	-7.8	-11.8	-7.8	-7.7	-8.2	-11.0	-7.2	-7.2	-7.2	-9.0
8 years	-9.9	-10.0	-9.0	-12.2	-9.8	-9.8	-9.6	-12.2	-8.0	-8.2	-7.0	-9.9
9 years	-9.2	-9.2	-8.7	-14.6	-9.0	-8.8	-9.2	-16.4	-7.8	-7.9	-6.3	-13.2
10 years	-10.5	-10.6	-9.4	-12.5	-10.8	-10.9	-9.2	-10.4	-9.4	-9.5	-8.2	-12.5
11 years	-10.6	-10.6	-10.8	-10.0	-10.2	-10.1	-11.4	-0.2	-9.3	-9.4	-9.0	-1.2

Age and sex	2000 cps				3000 cps				4000 cps			
	Total	White	Negro	Other races	Total	White	Negro	Other races	Total	White	Negro	Other races
	Decibels re audiometric zero (ASA-1951)											
Both sexes												
6-11 years	-9.2	-9.3	-8.4	-10.4	-5.2	-5.3	-3.5	-9.5	-2.0	-2.3	-0.4	-1.8
6 years	-8.2	-8.2	-8.0	-10.8	-4.6	-4.4	-2.9	-7.5	-1.2	-1.4	-0.1	+2.2
7 years	-8.7	-8.8	-7.7	-7.2	-4.4	-4.7	-2.6	-10.6	-1.4	-1.6	+0.1	-1.9
8 years	-9.3	-9.4	-8.2	-10.4	-5.2	-5.6	-3.0	-2.9	-2.0	-2.3	+0.2	-2.9
9 years	-9.4	-9.4	-8.7	-10.1	-5.0	-5.2	-3.4	-10.1	-2.0	-2.4	+0.1	-1.6
10 years	-9.8	-10.0	-8.3	-7.1	-5.8	-6.0	-4.0	-11.6	-3.0	-3.3	-0.4	-4.2
11 years	-9.6	-9.5	-9.4	-5.4	-5.5	-5.5	-4.8	-2.8	-2.6	-2.8	-1.8	+8.4
Boys												
6-11 years	-8.9	-8.9	-8.5	-10.8	-4.8	-5.0	-3.6	-9.3	-1.9	-2.1	-0.4	-2.7
6 years	-8.0	-7.9	-8.0	-9.7	-4.0	-4.1	-3.3	-7.5	-1.0	-1.2	+0.2	-1.9
7 years	-8.5	-8.6	-7.9	-9.6	-4.0	-4.3	-2.1	-11.8	-1.2	-1.3	0.0	-7.5
8 years	-9.0	-9.1	-8.4	-12.5	-4.8	-5.1	-3.4	-2.5	-2.0	-2.2	-0.4	-6.2
9 years	-9.3	-9.2	-9.4	-10.6	-5.2	-5.3	-4.6	-6.9	-2.2	-2.3	-1.4	-3.0
10 years	-9.6	-9.6	-8.4	-17.5	-5.5	-5.7	-3.5	-22.5	-2.5	-3.0	+0.8	-7.5
11 years	-9.2	-9.2	-9.4	-4.0	-5.2	-5.2	-4.8	-7.1	-2.5	-2.6	-2.0	+9.8
Girls												
6-11 years	-9.4	-9.6	-8.3	-10.2	-5.5	-5.8	-3.5	-9.6	-2.2	-2.6	-0.4	-1.2
6 years	-8.6	-8.6	-8.2	-13.6	-5.4	-5.7	-2.8	-9.6	-1.5	-1.7	-0.6	+0.9
7 years	-9.0	-9.1	-7.7	-8.7	-5.0	-5.1	-3.3	-12.5	-1.8	-2.0	-0.2	-1.6
8 years	-9.7	-9.9	-8.3	-9.9	-5.8	-6.2	-2.9	-7.2	-2.0	-2.4	+0.4	-2.2
9 years	-9.6	-9.7	-8.1	-12.0	-4.9	-5.2	-2.5	-14.7	-2.0	-2.5	+1.4	-3.2
10 years	-10.1	-10.4	-8.2	-3.1	-6.2	-6.4	-4.7	-6.0	-3.6	-3.8	-1.6	-8.8
11 years	-9.9	-9.9	-9.6	-8.7	-5.9	-6.0	-5.1	-1.8	-2.8	-3.0	-1.8	+5.0

Table 1. Mean hearing levels at eight frequencies and estimates for speech of children, by race, age, and sex: United States, 1963-65—Con.

Age and sex	6000 cps				8000 cps				Speech[1]			
	Total	White	Negro	Other races	Total	White	Negro	Other races	Total	White	Negro	Other races
	Decibels re audiometric zero (ASA-1971)											
Both sexes												
6-11 years	-2.6	-2.5	-2.9	-3.5	-6.1	-6.0	-6.8	-10.2	-8.6	-8.7	-8.5	-10.2
6 years	-2.0	-1.9	-2.7	+1.1	-4.5	-4.2	-6.2	-5.3	-7.4	-7.3	-7.6	-8.6
7 years	-2.2	-2.2	-1.9	+1.6	-5.6	-5.4	-6.1	-6.9	-7.7	-7.7	-7.6	-9.0
8 years	-3.4	-3.3	-3.5	-2.9	-6.7	-6.6	-6.7	-11.2	-8.6	-8.7	-8.0	-7.5
9 years	-2.6	-2.4	-3.1	-4.0	-6.6	-6.5	-6.6	-9.4	-8.9	-8.4	-8.5	-10.6
10 years	-3.0	-3.0	-2.4	-3.8	-6.6	-6.7	-5.9	-14.6	-9.8	-9.9	-8.8	-10.4
11 years	-2.4	-2.2	-3.5	-0.4	-6.6	-6.3	-8.5	-6.0	-9.7	-9.7	-9.9	-3.7
Boys												
6-11 years	-2.4	-2.1	-3.5	-5.6	-5.8	-5.6	-6.4	-11.1	-8.4	-8.4	-8.6	-10.4
6 years	-1.8	-1.6	-3.3	+0.3	-3.7	-3.3	-6.0	-2.5	-7.1	-6.9	-7.7	-9.0
7 years	-2.0	-2.0	-2.0	+1.0	-5.6	-5.6	-5.2	-7.5	-7.4	-7.4	-7.5	-11.8
8 years	-2.8	-2.5	-4.8	-2.5	-6.0	-5.7	-7.1	-12.5	-8.2	-8.2	-7.9	-7.5
9 years	-2.6	-2.2	-5.0	-7.7	-6.7	-6.7	-6.1	-16.2	-9.1	-9.0	-9.5	-9.4
10 years	-2.6	-2.6	-1.9	-12.5	-6.4	-6.6	-5.1	-22.5	-9.4	-9.4	-9.0	-17.5
11 years	-2.0	-1.7	-4.3	-9.2	-6.2	-5.7	-9.3	-0.2	-9.6	-9.6	-10.1	-8.2
Girls												
6-11 years	-2.9	-3.0	-2.3	-1.8	-6.5	-6.4	-7.1	-9.4	-8.9	-8.9	-8.3	-10.0
6 years	-2.3	-2.3	-2.4	-1.5	-5.4	-5.1	-6.6	-9.0	-7.8	-7.8	-7.6	-10.6
7 years	-2.4	-2.5	-2.0	-1.5	-5.6	-5.3	-7.3	-9.6	-8.0	-8.0	-7.9	-10.2
8 years	-4.0	-4.2	-2.5	-7.5	-7.5	-7.6	-6.5	-12.5	-9.0	-9.1	-8.4	-9.9
9 years	-2.6	-2.7	-1.4	-3.8	-6.5	-6.3	-7.4	-6.4	-8.7	-8.8	-7.7	-13.8
10 years	-3.4	-3.5	-3.0	-2.5	-6.9	-6.9	-6.9	-11.8	-10.2	-10.4	-8.7	-9.6
11 years	-2.8	-2.8	-2.9	+3.8	-7.2	-7.0	-7.9	-12.0	-9.8	-9.8	-10.0	-2.6

[1]Average of hearing levels at 500, 1000, and 2000 cps.

Table 2. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among white children, by age and sex: United States, 1963-65

Age and sex	250 cps			500 cps			1000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-13.6	-9.8	-6.0	-13.2	-9.3	-5.3	-12.6	-8.7	-4.2
6 years	-12.3	-8.3	-3.4	-12.1	-7.9	-2.4	-11.9	-7.8	-2.1
7 years	-12.7	-9.0	-5.3	-12.3	-8.3	-3.3	-12.1	-8.0	-2.5
8 years	-13.8	-9.9	-6.1	-13.4	-9.3	-5.3	-12.5	-8.6	-3.9
9 years	-12.6	-9.9	-6.1	-13.4	-9.4	-5.6	-12.9	-8.8	-4.4
10 years	-13.9	-10.2	-6.5	-14.1	-10.3	-6.4	-13.3	-9.4	-5.6
11 years	-14.5	-10.7	-7.0	-14.1	-10.3	-6.6	-13.1	-9.5	-5.8
Boys									
6-11 years	-13.7	-9.9	-6.1	-13.1	-9.3	-5.2	-12.5	-8.6	-3.9
6 years	-12.4	-8.4	-3.4	-11.9	-7.5	-1.7	-11.8	-7.7	-2.0
7 years	-12.9	-9.3	-5.6	-12.1	-8.1	-2.8	-12.0	-7.7	-1.9
8 years	-13.7	-9.9	-6.0	-13.1	-8.9	-4.5	-12.3	-8.2	-2.9
9 years	-14.1	-10.3	-6.5	-13.6	-9.7	-5.9	-13.0	-9.0	-5.1
10 years	-14.3	-10.7	-7.0	-13.7	-10.0	-6.3	-12.9	-9.1	-5.3
11 years	-14.7	-11.0	-7.3	-14.2	-10.4	-6.7	-13.0	-9.4	-5.9
Girls									
6-11 years	-13.4	-9.6	-5.8	-13.4	-9.4	-5.5	-12.8	-8.8	-4.5
6 years	-12.2	-8.3	-3.5	-12.2	-8.2	-3.2	-12.0	-7.8	-2.1
7 years	-12.5	-8.7	-5.0	-12.6	-8.5	-3.8	-12.2	-8.2	-3.2
8 years	-13.8	-10.0	-6.1	-13.7	-9.7	-5.7	-12.8	-8.9	-5.1
9 years	-13.4	-9.6	-5.7	-13.3	-9.3	-5.4	-12.8	-8.6	-3.6
10 years	-14.4	-10.6	-6.9	-14.6	-10.6	-6.6	-13.6	-9.8	-5.9
11 years	-14.2	-10.4	-6.5	-14.0	-10.3	-6.5	-13.3	-9.5	-5.7

Age and sex	2000 cps			3000 cps			4000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-13.4	-9.6	-5.8	-11.0	-5.9	+0.1	-8.3	-2.4	+2.5
6 years	-12.9	-8.8	-4.4	-10.7	-5.4	+0.5	-6.4	-1.3	+3.1
7 years	-12.9	-9.3	-5.6	-10.3	-4.9	+0.5	-7.1	-1.6	+2.8
8 years	-13.6	-9.9	-6.1	-11.4	-6.2	+0.1	-8.0	-2.2	+2.6
9 years	-13.6	-9.7	-5.8	-11.0	-5.9	+0.2	-8.5	-2.5	+2.5
10 years	-13.9	-10.1	-6.3	-11.4	-6.6	-0.6	-9.4	-3.7	+1.5
11 years	-13.7	-10.0	-6.4	-11.2	-6.3	-0.2	-9.5	-3.6	+2.0
Boys									
6-11 years	-13.2	-9.4	-5.5	-10.8	-5.5	+0.5	-8.1	-2.2	+2.6
6 years	-12.6	-8.4	-3.3	-10.2	-4.8	+1.1	-6.2	-1.1	+3.4
7 years	-12.8	-9.1	-5.4	-10.0	-4.2	+1.1	-6.7	-1.4	+3.0
8 years	-13.5	-9.7	-5.9	-11.1	-5.7	+0.5	-8.2	-2.2	+2.6
9 years	-13.5	-9.6	-5.7	-11.1	-6.1	0.0	-8.5	-2.4	+2.7
10 years	-13.6	-9.8	-6.0	-11.2	-6.2	-0.1	-8.8	-3.0	+1.9
11 years	-13.5	-9.7	-6.0	-10.9	-6.0	0.0	-9.3	-3.5	+2.0
Girls									
6-11 years	-13.6	-9.8	-6.1	-11.2	-6.3	-0.3	-8.5	-2.5	+2.3
6 years	-13.1	-9.2	-5.2	-11.2	-6.1	-0.2	-6.6	-1.4	+2.9
7 years	-13.1	-9.4	-5.8	-10.7	-5.6	0.0	-7.5	-1.9	+2.7
8 years	-13.8	-10.0	-6.3	-11.6	-6.6	-0.4	-7.8	-2.1	+2.6
9 years	-13.8	-9.8	-5.9	-10.9	-5.6	+0.4	-8.5	-2.5	+2.3
10 years	-14.2	-10.4	-6.6	-11.6	-7.0	-1.1	-9.9	-4.5	+1.0
11 years	-13.8	-10.3	-6.7	-11.4	-6.7	-0.5	-9.6	-3.7	+2.1

Table 2. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among white children, by age and sex: United States, 1963-65—Con.

Age and sex	6000 cps			8000 cps			Speech[2]		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-9.3	-2.9	+2.8	-12.1	-7.1	-0.3	-12.8	-9.2	-5.6
6 years	-8.5	-2.3	+3.1	-11.2	-5.7	+1.3	-12.0	-8.3	-3.8
7 years	-8.8	-2.4	+3.0	-11.7	-6.4	+0.2	-12.2	-8.5	-4.4
8 years	-9.9	-3.5	+2.1	-12.4	-7.6	-0.8	-12.8	-9.3	-5.8
9 years	-9.6	-3.3	+2.7	-12.7	-7.6	-0.9	-12.9	-9.4	-5.9
10 years	-9.8	-3.3	+2.4	-12.4	-7.8	-1.5	-13.3	-9.9	-6.4
11 years	-9.2	-2.7	+3.1	-12.5	-7.6	-0.8	-13.2	-9.7	-6.3
Boys									
6-11 years	-9.1	-2.6	+3.1	-12.0	-6.8	+0.1	-12.6	-9.0	-5.4
6 years	-8.3	-1.9	+3.7	-11.3	-4.1	+2.2	-11.8	-8.0	-3.2
7 years	-8.6	-2.3	+3.0	-11.9	-6.8	0.0	-12.1	-8.2	-3.5
8 years	-9.6	-3.2	+2.7	-11.8	-7.0	+0.1	-12.6	-9.1	-5.5
9 years	-9.6	-3.2	+3.1	-12.7	-7.6	-1.1	-12.9	-9.4	-5.9
10 years	-9.4	-2.8	+2.5	-12.3	-7.8	-1.4	-13.0	-9.5	-6.0
11 years	-9.1	-2.5	+3.5	-12.3	-7.2	0.0	-13.1	-9.7	-6.3
Girls									
6-11 years	-9.5	-3.1	+2.4	-12.3	-7.4	-0.8	-12.2	-9.4	-5.8
6 years	-8.8	-2.7	+2.6	-11.7	-6.9	0.0	-12.2	-8.5	-4.5
7 years	-9.0	-2.4	+3.0	-11.4	-5.9	+0.3	-12.4	-8.8	-5.2
8 years	-10.3	-3.9	+1.7	-13.0	-8.2	-1.9	-13.0	-9.6	-6.1
9 years	-9.6	-3.4	+2.4	-12.6	-7.7	-0.8	-12.9	-9.4	-5.9
10 years	-10.1	-3.9	+2.2	-12.4	-7.8	-1.6	-13.7	-10.2	-6.8
11 years	-9.3	-2.8	+2.7	-12.7	-7.9	-1.4	-13.2	-9.8	-6.3

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children, respectively fall.

[2] Average of hearing levels at 500, 1000, and 2000 cps.

Table 3. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among Negro children, by age and sex: United States, 1963-65

Age and sex	250 cps			500 cps			1000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-13.6	-9.9	-6.2	-13.6	-9.8	-5.9	-12.2	-8.3	-3.6
6 years	-12.4	-8.9	-5.4	-12.7	-9.1	-5.4	-11.7	-7.9	-2.9
7 years	-12.4	-8.6	-4.6	-12.3	-8.6	-4.5	-12.1	-7.6	-1.9
8 years	-13.4	-10.0	-6.7	-13.7	-9.7	-5.8	-11.8	-8.0	-2.9
9 years	-14.2	-10.4	-6.6	-13.8	-10.0	-6.2	-12.4	-8.6	-4.3
10 years	-14.8	-10.8	-6.8	-14.5	-10.4	-6.4	-12.2	-8.6	-4.8
11 years	-15.1	-11.1	-7.2	-15.2	-11.1	-7.1	-12.9	-9.2	-5.5
Boys									
6-11 years	-14.2	-10.5	-6.7	-14.0	-10.1	-6.1	-12.1	-8.2	-3.4
6 years	-12.6	-9.4	-6.1	-13.5	-10.0	-6.4	-11.5	-7.5	-2.1
7 years	-12.9	-9.1	-5.4	-12.5	-8.7	-4.9	-11.9	-7.2	-1.2
8 years	-13.9	-10.5	-7.1	-13.7	-9.5	-5.2	-11.7	-7.9	-2.7
9 years	-14.9	-10.8	-6.7	-13.7	-10.0	-6.3	-12.9	-9.2	-5.5
10 years	-17.5	-12.1	-7.7	-16.7	-11.3	-6.6	-12.0	-8.2	-3.6
11 years	-16.1	-11.7	-7.9	-16.1	-11.5	-7.6	-12.8	-9.3	-5.7
Girls									
6-11 years	-13.1	-9.4	-5.7	-13.2	-9.4	-5.7	-12.3	-8.4	-3.9
6 years	-12.1	-8.3	-3.6	-11.8	-8.1	-3.5	-11.9	-8.2	-3.9
7 years	-12.1	-8.2	-3.4	-12.2	-8.4	-4.2	-12.5	-8.1	-2.6
8 years	-12.9	-9.6	-6.3	-13.6	-10.0	-6.4	-11.9	-8.1	-3.1
9 years	-13.5	-10.0	-6.6	-13.8	-9.9	-6.1	-11.9	-7.9	-2.6
10 years	-13.4	-9.7	-5.9	-13.5	-9.8	-6.2	-12.5	-8.9	-5.4
11 years	-14.6	-10.5	-6.4	-14.7	-10.6	-6.5	-13.1	-9.2	-5.4

Age and sex	2000 cps			3000 cps			4000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-12.8	-8.9	-5.0	-9.4	-3.5	+1.5	-4.5	-0.4	+3.6
6 years	-12.0	-8.4	-4.7	-8.6	-3.0	+1.4	-3.8	0.0	+3.8
7 years	-12.5	-8.2	-2.8	-9.4	-2.8	+2.3	-4.2	-0.2	+3.8
8 years	-12.8	-8.9	-5.1	-8.5	-2.9	+1.6	-3.8	0.0	+3.8
9 years	-13.2	-9.4	-5.6	-9.7	-3.8	+1.6	-4.6	-0.4	+3.8
10 years	-13.3	-9.0	-4.4	-10.2	-4.9	+0.8	-5.7	-0.8	+3.8
11 years	-13.5	-9.8	-6.0	-9.9	-4.2	+0.8	-6.7	-1.6	+2.6
Boys									
6-11 years	-12.9	-9.2	-5.4	-9.3	-3.5	+1.4	-4.5	-0.6	+3.4
6 years	-12.1	-8.6	-5.2	-8.7	-3.2	+1.0	-3.4	0.0	+3.4
7 years	-12.6	-8.6	-4.0	-8.4	-2.0	+2.8	-4.4	-0.4	+3.6
8 years	-12.9	-9.1	-4.6	-8.4	-2.8	+1.6	-3.7	0.0	+3.7
9 years	-13.5	-9.8	-6.0	-10.5	-5.5	+0.5	-6.3	-1.4	+2.9
10 years	-13.2	-9.4	-5.5	-9.7	-4.0	+1.2	-4.7	-0.1	+4.6
11 years	-13.6	-9.8	-6.0	-9.7	-3.8	+1.0	-6.7	-1.8	+2.3
Girls									
6-11 years	-12.7	-8.7	-4.1	-9.5	-3.6	+1.5	-4.5	-0.3	+3.9
6 years	-11.9	-8.2	-3.9	-8.4	-2.8	+1.9	-4.3	0.0	+4.3
7 years	-12.4	-7.7	-1.9	-10.1	-3.7	+1.8	-4.0	0.0	+3.9
8 years	-12.7	-8.7	-4.4	-8.6	-2.9	+1.6	-3.9	+0.1	+4.0
9 years	-12.8	-9.0	-5.2	-8.4	-2.4	+2.4	-3.6	+0.6	+4.8
10 years	-13.3	-8.6	-2.9	-10.7	-5.8	+0.3	-6.9	-1.4	+3.1
11 years	-13.4	-9.7	-6.1	-10.1	-4.6	+0.5	-6.7	-1.4	+3.0

Table 3. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among Negro children, by age and sex: United States, 1963-65—Con.

Age and sex	6000 cps			8000 cps			Speech[2]		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-9.5	-3.2	+2.3	-12.2	-7.6	-1.5	-12.5	-9.1	-5.7
6 years	-8.5	-2.6	+2.4	-11.5	-7.0	-1.3	-12.2	-8.8	-5.4
7 years	-8.4	-2.2	+3.0	-11.3	-6.2	-0.3	-12.1	-8.3	-3.6
8 years	-9.9	-4.1	+1.5	-12.7	-8.0	-1.7	-12.3	-8.8	-5.4
9 years	-10.5	-3.8	+2.2	-13.1	-8.3	-1.5	-12.6	-9.2	-5.8
10 years	-9.3	-3.1	+2.3	-11.6	-7.2	-1.1	-12.8	-9.6	-6.3
11 years	-10.3	-4.0	+2.2	-13.4	-9.0	-3.4	-13.1	-9.8	-6.5
Boys									
6-11 years	-9.8	-3.7	+1.8	-12.1	-7.5	-1.3	-12.7	-9.2	-5.8
6 years	-9.0	-3.0	+2.4	-11.3	-7.1	-1.5	-12.3	-9.0	-5.7
7 years	-8.4	-2.1	+3.2	-10.3	-4.8	+0.4	-12.4	-8.8	-5.2
8 years	-10.1	-4.8	+0.7	-12.8	-8.0	-1.7	-12.3	-8.7	-5.0
9 years	-11.4	-5.7	+0.7	-13.0	-8.4	-1.7	-13.0	-9.5	-6.0
10 years	-9.0	-3.0	+2.3	-11.6	-6.7	-0.5	-12.9	-9.6	-6.2
11 years	-10.5	-3.9	+1.3	-13.6	-9.4	-5.1	-13.4	-10.0	-6.6
Girls									
6-11 years	-9.1	-2.8	+2.8	-12.4	-7.7	-1.7	-12.4	-9.0	-5.5
6 years	-7.9	-2.2	+2.5	-11.8	-6.8	-1.0	-12.0	-8.6	-5.1
7 years	-8.4	-2.2	+2.9	-12.2	-7.5	-1.3	-12.1	-8.0	-2.9
8 years	-9.6	-3.4	+2.3	-12.5	-8.0	-1.7	-12.3	-9.0	-5.7
9 years	-9.2	-2.1	+3.5	-13.1	-8.2	-2.0	-12.2	-9.0	-5.7
10 years	-9.5	-3.3	+2.2	-11.7	-7.5	-1.9	-12.7	-9.5	-6.4
11 years	-10.1	-4.1	+3.5	-13.0	-8.5	-3.0	-12.9	-9.6	-6.3

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children respectively fall.

[2] Average of hearing levels at 500,1000, and 2000 cps.

Table 4. Mean hearing levels at eight frequencies and estimates for speech of children, by region, age, and sex: United States, 1963-65

Age and sex	250 cps				500 cps				1000 cps			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
Both sexes	Decibels re audiometric zero (ASA-1951)											
6-11 years	-9.4	-9.1	-8.7	-10.8	-9.0	-8.8	-8.0	-10.0	-7.3	-8.0	-7.1	-8.8
6 years	-7.3	-7.2	-6.6	-8.3	-7.3	-7.1	-6.2	-8.0	-6.5	-6.7	-5.8	-7.2
7 years	-7.8	-7.8	-7.7	-9.6	-7.5	-7.2	-7.0	-8.7	-6.2	-6.8	-6.3	-7.9
8 years	-10.4	-9.0	-8.9	-10.8	-9.3	-8.9	-8.1	-9.8	-7.0	-7.6	-6.9	-8.1
9 years	-9.5	-9.2	-9.3	-10.9	-9.4	-9.3	-8.4	-9.7	-7.4	-8.1	-7.0	-9.4
10 years	-10.5	-10.0	-9.4	-13.1	-10.1	-10.1	-9.0	-12.2	-7.9	-8.9	-7.7	-10.8
11 years	-10.6	-10.7	-10.3	-12.3	-10.3	-10.2	-9.3	-11.6	-8.6	-9.3	-7.7	-9.9
Boys												
6-11 years	-9.7	-9.1	-9.2	-11.1	-8.7	-8.7	-8.2	-9.7	-6.8	-7.7	-7.2	-8.5
6 years	-7.8	-7.1	-7.0	-8.4	-7.6	-6.7	-6.2	-7.8	-6.4	-6.6	-5.7	-6.5
7 years	-8.4	-8.1	-8.0	-9.8	-7.2	-6.7	-7.3	-8.5	-5.6	-6.4	-6.5	-7.6
8 years	-10.3	-8.7	-9.2	-11.0	-8.7	-8.7	-7.9	-8.5	-5.9	-7.1	-6.8	-8.0
9 years	-9.9	-10.0	-10.3	-11.6	-9.4	-9.9	-8.8	-10.1	-7.1	-8.4	-8.2	-9.5
10 years	-11.2	-10.1	-10.3	-13.3	-9.8	-9.8	-9.2	-11.8	-7.8	-8.4	-7.8	-10.2
11 years	-10.6	-10.7	-11.0	-13.1	-9.9	-10.4	-10.2	-11.7	-8.0	-9.1	-8.5	-9.8
Girls												
6-11 years	-9.0	-9.0	-8.2	-10.5	-9.2	-9.0	-7.9	-10.4	-7.8	-8.2	-7.0	-9.2
6 years	-6.9	-7.5	-6.1	-8.2	-7.1	-7.5	-6.4	-8.2	-6.6	-6.9	-5.9	-8.0
7 years	-7.4	-7.6	-7.5	-9.6	-7.9	-7.7	-6.8	-9.1	-6.8	-7.3	-6.3	-8.7
8 years	-10.5	-9.5	-8.7	-10.7	-9.9	-9.2	-8.4	-11.4	-8.1	-8.3	-7.2	-8.3
9 years	-9.3	-8.6	-8.5	-10.4	-9.5	-8.7	-8.2	-9.5	-7.9	-7.9	-5.9	-9.4
10 years	-9.9	-10.1	-8.7	-13.0	-10.6	-10.6	-9.0	-12.6	-8.2	-9.5	-7.8	-11.4
11 years	-10.7	-10.8	-9.8	-11.4	-10.9	-10.1	-8.6	-11.5	-9.4	-9.6	-8.9	-9.3

Age and sex	2000 cps				3000 cps				4000 cps			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
Both sexes	Decibels re audiometric zero (ASA-1951)											
6-11 years	-9.0	-9.0	-8.5	-10.1	-5.4	-5.2	-4.2	-5.6	-2.0	-2.7	-1.0	-2.4
6 years	-8.1	-6.7	-8.1	-8.8	-5.3	-5.1	-3.7	-4.3	-1.9	-1.9	-0.2	-1.1
7 years	-8.3	-8.2	-8.3	-9.8	-4.3	-4.6	-4.0	-4.7	-0.8	-2.4	-0.5	-1.4
8 years	-9.2	-9.1	-8.7	-9.9	-5.5	-5.0	-4.8	-5.5	-1.9	-2.3	-0.9	-2.2
9 years	-9.0	-9.3	-8.4	-10.7	-5.5	-4.6	-3.4	-6.6	-2.1	-2.6	-0.4	-2.8
10 years	-9.8	-9.3	-8.5	-11.4	-6.0	-5.4	-4.6	-7.1	-2.7	-3.3	-1.6	-4.0
11 years	-9.4	-9.9	-8.6	-10.0	-5.8	-5.9	-4.5	-5.5	-2.8	-3.3	-1.8	-2.3
Boys												
6-11 years	-8.7	-8.6	-8.5	-9.7	-5.1	-4.7	-4.0	-5.3	-1.7	-2.6	-0.8	-2.1
6 years	-7.9	-7.6	-7.9	-8.1	-4.9	-4.2	-3.3	-3.5	-1.7	-1.4	-0.4	-0.8
7 years	-8.3	-8.0	-8.2	-9.3	-4.0	-4.3	-3.8	-4.0	-0.9	-2.3	-0.1	-1.0
8 years	-9.1	-8.9	-8.0	-9.8	-5.4	-4.2	-4.4	-5.4	-1.3	-2.5	-1.1	-2.5
9 years	-8.4	-9.1	-8.8	-10.8	-5.3	-5.0	-4.2	-6.6	-1.9	-3.2	-0.7	-2.8
10 years	-9.7	-8.9	-8.8	-10.8	-5.7	-5.3	-3.8	-6.9	-2.3	-2.5	-1.1	-3.9
11 years	-8.8	-9.2	-9.4	-9.4	-5.1	-5.3	-4.4	-5.5	-2.2	-3.8	-1.8	-1.9
Girls												
6-11 years	-9.3	-9.3	-8.5	-10.6	-5.8	-5.6	-4.4	-6.0	-2.4	-2.7	-1.1	-2.6
6 years	-8.4	-7.9	-8.3	-9.4	-5.8	-6.2	-4.2	-5.1	-2.2	-2.2	-0.1	-1.4
7 years	-8.5	-8.5	-8.6	-10.6	-4.7	-4.9	-4.4	-5.8	-0.8	-2.7	-1.1	-2.3
8 years	-9.4	-9.5	-9.6	-10.2	-5.7	-6.0	-5.3	-5.8	-2.5	-2.2	-1.0	-2.1
9 years	-9.6	-9.5	-8.2	-10.7	-5.9	-4.4	-2.8	-6.8	-2.4	-2.1	-0.4	-3.0
10 years	-10.1	-9.9	-8.4	-12.0	-6.4	-5.8	-5.3	-7.2	-3.3	-4.3	-2.1	-4.2
11 years	-10.2	-10.7	-8.0	-10.8	-6.6	-6.7	-4.6	-5.6	-3.6	-2.9	-1.9	-3.0

Table 4. Mean hearing levels at eight frequencies and estimates for speech of children, by region, age, and sex: United States, 1963-65—Con.

Age and sex	6000 cps				8000 cps				Speech[1]			
	North-east	Mid-west	South	West	North-east	Mid-west	South	West	North-east	Mid-west	South	West
	Decibels re audiometric zero (ASA-1951)											
Both sexes												
6-11 years	-2.3	-2.4	-2.4	-3.6	-5.1	-7.3	-5.2	-6.5	-8.4	-8.6	-7.9	-9.7
6 years	-2.1	-1.8	-1.7	-2.4	-3.1	-5.8	-4.2	-4.5	-7.3	-7.2	-6.7	-8.6
7 years	-1.7	-1.9	-2.0	-3.1	-4.6	-6.7	-5.1	-5.4	-7.2	-7.3	-7.1	-8.9
8 years	-3.9	-3.1	-2.9	-3.3	-6.2	-7.5	-3.3	-6.3	-8.4	-7.6	-7.9	-9.1
9 years	-1.5	-3.0	-1.4	-4.1	-5.4	-8.2	-4.6	-7.5	-8.6	-8.9	-8.0	-9.8
10 years	-2.0	-2.3	-2.2	-4.9	-5.1	-7.0	-5.6	-8.2	-9.3	-9.4	-8.5	-10.5
11 years	-2.0	-2.1	-1.6	-3.6	-6.0	-8.1	-5.3	-6.5	-9.4	-9.8	-9.0	-10.3
Boys												
6-11 years	-1.9	-2.2	-1.9	-3.2	-4.6	-7.0	-4.8	-6.1	-8.0	-8.4	-8.0	-9.3
6 years	-2.2	-1.9	-1.4	-1.8	-2.5	-5.2	-3.1	-3.8	-7.2	-7.0	-6.5	-7.5
7 years	-1.3	-2.4	-1.8	-2.4	-5.0	-7.2	-4.7	-5.1	-6.9	-7.0	-7.2	-8.5
8 years	-3.3	-2.9	-2.6	-2.5	-5.1	-6.8	-6.2	-5.6	-7.7	-8.4	-7.6	-8.8
9 years	-1.5	-2.9	-2.1	-3.9	-4.9	-8.5	-5.0	-8.0	-8.4	-9.2	-8.7	-10.0
10 years	-1.3	-1.6	-2.1	-5.1	-5.1	-6.7	-5.4	-8.1	-9.1	-8.9	-8.6	-10.9
11 years	-1.9	-1.4	-1.1	-3.6	-5.3	-7.4	-5.0	-6.6	-8.9	-9.7	-9.6	-10.2
Girls												
6-11 years	-2.7	-2.7	-2.2	-4.1	-5.6	-7.6	-5.6	-6.8	-8.7	-8.9	-7.8	-10.1
6 years	-2.1	-1.8	-2.0	-3.1	-4.0	-6.6	-5.5	-5.3	-7.5	-7.7	-7.0	-8.7
7 years	-2.2	-1.5	-2.3	-4.1	-4.3	-6.3	-5.6	-6.2	-7.6	-7.7	-7.2	-9.7
8 years	-4.5	-3.5	-3.4	-4.4	-7.2	-8.6	-6.6	-7.3	-9.1	-8.9	-8.3	-9.7
9 years	-1.7	-3.2	-0.8	-4.6	-6.0	-8.0	-4.5	-7.2	-9.0	-8.8	-7.4	-9.8
10 years	-3.0	-3.2	-2.4	-4.9	-5.3	-7.4	-5.9	-8.4	-9.7	-10.1	-8.4	-12.1
11 years	-2.2	-2.9	-2.2	-3.7	-6.8	-8.9	-5.8	-6.7	-10.1	-10.1	-8.6	-10.5

[1]Average of hearing levels at 500, 1000, and 2000 cps.

Table 5. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech[2] among children in the Northeast, by age and sex: United States, 1963-65

Age and sex	250 cps			500 cps			1000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-13.5	-9.7	-6.0	-13.4	-9.4	-5.4	-12.4	-8.2	-3.0
6 years	-12.3	-8.4	-3.8	-14.0	-8.1	-2.8	-11.8	-7.4	-1.7
7 years	-12.1	-8.6	-5.1	-12.2	-8.4	-3.9	-11.7	-7.5	-1.7
8 years	-14.2	-10.3	-6.5	-13.6	-9.7	-5.7	-12.1	-8.1	-2.8
9 years	-13.6	-9.9	-6.3	-13.8	-9.9	-6.0	-12.6	-8.4	-3.2
10 years	-14.7	-10.8	-7.0	-14.3	-10.2	-6.2	-13.1	-9.1	-5.1
11 years	-14.4	-10.6	-6.7	-14.6	-10.5	-6.5	-13.0	-9.2	-5.3
Boys									
6-11 years	-13.5	-10.0	-6.4	-13.2	-9.4	-5.5	-12.2	-8.0	-2.4
6 years	-12.5	-9.0	-5.4	-12.4	-8.6	-4.5	-11.7	-7.5	-1.9
7 years	-12.3	-9.0	-5.7	-12.0	-8.5	-4.8	-11.5	-7.4	-1.3
8 years	-14.2	-10.3	-6.4	-13.4	-9.3	-5.2	-11.4	-7.1	-1.0
9 years	-13.6	-10.1	-6.6	-13.6	-9.8	-5.9	-12.4	-8.1	-2.5
10 years	-13.2	-11.1	-7.5	-14.0	-10.1	-6.2	-13.2	-9.0	-4.4
11 years	-14.1	-10.7	-7.2	-14.2	-10.2	-6.2	-12.9	-8.9	-4.6
Girls									
6-11 years	-13.4	-9.4	-5.4	-13.6	-9.5	-5.3	-12.5	-8.5	-3.8
6 years	-12.0	-7.7	-1.9	-12.2	-7.4	-1.6	-11.9	-7.3	-1.5
7 years	-11.9	-8.2	-3.4	-12.4	-8.3	-3.3	-11.8	-7.7	-2.1
8 years	-14.1	-10.3	-6.6	-13.9	-10.0	-6.1	-12.6	-8.8	-4.8
9 years	-13.7	-9.8	-5.9	-13.9	-10.0	-6.1	-12.8	-8.7	-4.0
10 years	-14.5	-10.4	-6.4	-14.7	-10.4	-6.1	-12.9	-9.2	-5.4
11 years	-14.8	-10.5	-6.1	-15.1	-10.9	-6.8	-13.2	-9.5	-5.8

Age and sex	2000 cps			3000 cps			4000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-13.4	-9.5	-5.5	-11.1	-6.1	-0.1	-10.7	-5.7	+0.3
6 years	-13.0	-8.8	-4.2	-11.1	-6.3	-0.3	-10.3	-5.0	+0.5
7 years	-12.7	-8.8	-5.0	-10.2	-5.0	+0.5	-9.7	-4.2	+1.2
8 years	-13.6	-9.8	-5.9	-11.1	-5.7	+0.1	-11.0	-6.3	-0.2
9 years	-13.4	-9.3	-5.2	-11.1	-5.9	0.0	-11.0	-6.0	0.0
10 years	-14.6	-10.4	-6.3	-11.7	-7.1	-0.9	-11.2	-6.4	-0.2
11 years	-13.5	-9.9	-6.3	-11.4	-6.5	-0.6	-10.9	-6.3	+0.1
Boys									
6-11 years	-13.3	-9.3	-5.3	-10.9	-5.8	+0.1	-10.5	-5.4	+0.6
6 years	-12.7	-8.7	-4.3	-11.5	-6.5	-0.5	-9.9	-4.2	+0.8
7 years	-12.8	-9.0	-5.3	-10.5	-5.4	+0.2	-9.5	-4.0	-1.3
8 years	-13.7	-9.6	-5.5	-11.1	-5.8	0.0	-10.6	-5.7	+0.2
9 years	-13.0	-8.8	-4.1	-11.2	-6.1	0.0	-10.8	-5.9	0.0
10 years	-14.5	-10.3	-6.1	-11.8	-7.3	-1.3	-11.4	-6.1	+0.3
11 years	-13.2	-9.5	-5.8	-11.8	-7.2	-1.3	-10.8	-6.1	+0.6
Girls									
6-11 years	-13.5	-9.6	-5.7	-11.3	-6.3	-0.4	-10.8	-6.0	-0.1
6 years	-13.2	-8.9	-4.2	-11.5	-6.5	-0.5	-10.6	-5.7	+0.1
7 years	-12.5	-8.6	-4.2	-10.5	-5.4	+0.2	-9.9	-4.4	+1.0
8 years	-13.6	-9.9	-6.2	-11.1	-5.8	0.0	-11.3	-6.7	-0.6
9 years	-13.8	-9.8	-5.8	-11.2	-6.1	0.0	-11.1	-6.1	-0.1
10 years	-14.7	-10.6	-6.5	-11.8	-7.3	-1.3	-11.1	-6.8	-0.9
11 years	-13.8	-10.3	-6.7	-11.8	-7.2	-1.3	-11.0	-6.6	-0.4

Table 5. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among children in the Northeast, by age and sex: United States, 1963-65—Con.

Age and sex	6000 cps			8000 cps			Speech[2]		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-9.0	-2.5	+2.9	-11.5	-6.3	+0.5	-12.7	-9.0	-5.3
6 years	-8.6	-2.4	+2.8	-10.5	-4.7	+2.0	-12.1	-8.3	-3.8
7 years	-7.5	-1.7	+3.1	-10.8	-4.9	+1.0	-11.9	-8.2	-3.6
8 years	-10.3	-3.8	+1.9	-12.3	-7.4	-0.6	-12.7	-9.2	-5.6
9 years	-9.4	-2.7	+3.3	-12.0	-6.4	+0.3	-12.8	-9.2	-5.6
10 years	-9.0	-2.4	+2.6	-11.4	-6.8	-0.2	-13.6	-9.7	-5.9
11 years	-8.5	-1.9	+3.4	-12.3	-7.4	-0.6	-13.1	-9.5	-5.9
Boys									
6-11 years	-8.5	-2.1	+3.1	-11.4	-5.9	+1.0	-12.5	-8.8	-5.0
6 years	-8.5	-2.3	+3.0	-10.0	-3.5	+2.9	-12.1	-8.4	-4.2
7 years	-7.0	-1.3	+3.4	-11.0	-5.5	+0.8	-11.8	-8.2	-3.8
8 years	-9.4	-2.9	+2.6	-11.7	-6.6	+0.7	-12.3	-8.5	-4.4
9 years	-9.5	-2.6	+3.7	-11.9	-5.8	+0.6	-12.8	-9.0	-5.2
10 years	-7.6	-1.7	+2.7	-11.5	-6.9	-0.2	-13.7	-9.6	-5.5
11 years	-8.6	-2.1	+3.3	-12.2	-6.8	+0.4	-12.9	-9.2	-5.5
Girls									
6-11 years	-9.3	-2.8	+2.6	-11.7	-6.7	0.0	-12.8	-9.2	-5.6
6 years	-8.7	-2.6	+2.6	-10.8	-5.8	+1.0	-12.2	-8.2	-3.4
7 years	-7.9	-2.0	+2.8	-10.5	-4.3	+1.2	-12.0	-8.2	-3.5
8 years	-11.0	-4.6	+1.4	-12.6	-8.0	-1.7	-13.1	-9.6	-6.2
9 years	-9.2	-2.7	+2.9	-12.1	-6.8	-0.1	-12.8	-9.4	-5.9
10 years	-10.3	-3.6	+2.5	-11.2	-6.5	-0.1	-13.5	-9.9	-6.3
11 years	-8.5	-1.7	+3.6	-12.4	-7.9	-1.7	-13.3	-9.9	-6.4

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children respectively fall.

[2] Average of hearing levels at 500, 1000, and 2000 cps.

Table 6. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among children in the Midwest, by age and sex: United States, 1963-65

Age and sex	250 cps			500 cps			1000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-13.0	-9.4	-5.9	-12.9	-9.2	-5.5	-12.4	-8.7	-5.0
6 years	-12.0	-8.3	-4.0	-12.0	-8.0	-3.0	-11.9	-8.1	-3.4
7 years	-12.3	-8.7	-5.2	-12.2	-8.1	-2.9	-12.1	-8.1	-2.7
8 years	-12.9	-9.3	-5.6	-13.0	-9.3	-5.5	-12.3	-8.5	-4.4
9 years	-13.3	-9.7	-6.0	-12.9	-9.4	-5.9	-12.7	-8.9	-5.1
10 years	-13.3	-10.0	-6.6	-13.6	-10.0	-6.4	-12.5	-9.0	-5.5
11 years	-13.9	-10.4	-6.9	-13.7	-10.3	-6.9	-12.9	-9.6	-6.2
Boys									
6-11 years	-13.0	-9.4	-5.8	-12.9	-9.1	-5.4	-12.2	-8.5	-4.4
6 years	-12.1	-8.1	-3.0	-12.1	-7.7	-2.0	-12.1	-8.3	-3.8
7 years	-12.4	-8.7	-5.1	-11.8	-7.5	-1.8	-11.6	-7.3	-1.5
8 years	-12.6	-9.1	-5.5	-12.9	-9.0	-5.2	-11.9	-8.0	-2.6
9 years	-13.6	-9.9	-6.2	-12.9	-9.5	-6.2	-12.6	-9.0	-5.4
10 years	-13.3	-9.9	-6.5	-13.5	-9.8	-6.2	-12.2	-8.5	-4.3
11 years	-13.7	-10.4	-7.1	-13.6	-10.3	-7.0	-12.8	-9.6	-6.4
Girls									
6-11 years	-13.0	-9.4	-5.9	-13.0	-9.3	-5.7	-12.6	-8.9	-5.3
6 years	-11.9	-8.5	-5.0	-11.9	-8.3	-4.1	-11.7	-7.9	-3.0
7 years	-12.2	-8.8	-5.3	-12.5	-8.6	-4.3	-12.6	-8.7	-4.3
8 years	-13.3	-9.6	-5.8	-13.2	-9.5	-5.9	-12.6	-9.1	-5.6
9 years	-13.0	-9.4	-5.9	-12.9	-9.2	-5.6	-12.7	-8.7	-4.2
10 years	-13.3	-10.0	-6.8	-13.6	-10.1	-6.6	-12.8	-9.5	-6.2
11 years	-14.1	-10.4	-6.8	-13.8	-10.2	-6.7	-13.1	-9.6	-6.1

Age and sex	2000 cps			3000 cps			4000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-13.1	-9.3	-5.6	-10.8	-5.7	+0.3	-8.4	-2.4	+2.4
6 years	-12.5	-8.4	-3.6	-11.0	-5.7	+0.3	-5.2	-1.0	+3.1
7 years	-12.6	-8.8	-5.0	-10.4	-4.6	+0.8	-7.9	-2.1	+2.4
8 years	-13.4	-9.6	-5.8	-10.8	-5.5	+0.8	-8.3	-2.2	+2.9
9 years	-13.1	-9.5	-5.9	-10.6	-5.3	+0.6	-8.9	-2.7	+2.5
10 years	-13.0	-9.3	-5.7	-10.7	-5.8	-0.2	-8.8	-3.0	+1.8
11 years	-13.7	-10.2	-6.7	-11.2	-6.9	-1.1	-9.7	-3.9	+1.5
Boys									
6-11 years	-12.8	-9.1	-5.4	-10.6	-5.1	+0.7	-8.4	-2.4	+2.4
6 years	-12.4	-8.0	-2.5	-10.2	-4.1	+1.2	-4.9	-0.9	+3.1
7 years	-12.4	-8.7	-5.0	-10.4	-4.1	+1.2	-7.8	-2.0	+2.4
8 years	-13.0	-9.4	-5.8	-10.4	-4.6	+1.4	-8.5	-2.2	+2.8
9 years	-12.7	-9.3	-5.9	-10.8	-5.5	+0.4	-9.6	-3.3	+2.2
10 years	-13.0	-9.1	-5.3	-10.6	-5.5	+0.2	-7.6	-2.0	+2.5
11 years	-13.4	-9.9	-6.4	-10.9	-6.5	-0.7	-9.9	-4.3	+1.0
Girls									
6-11 years	-13.3	-9.5	-5.8	-11.0	-6.2	-0.2	-8.4	-2.5	+2.4
6 years	-12.6	-8.8	-5.0	-11.7	-7.0	-0.9	-5.6	-1.1	+3.1
7 years	-12.9	-8.9	-5.0	-10.5	-5.0	+0.4	-8.0	-2.1	+2.4
8 years	-13.7	-9.7	-5.7	-11.2	-6.3	+0.1	-8.0	-2.1	+2.9
9 years	-13.6	-9.7	-5.8	-10.4	-5.0	+0.8	-8.0	-2.1	+2.7
10 years	-12.9	-9.5	-6.1	-10.9	-6.1	-0.6	-9.8	-4.3	+0.9
11 years	-14.0	-10.5	-7.0	-11.5	-7.3	-1.6	-9.4	-3.5	+2.0

Table 6. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among children in the Midwest, by age and sex: United States, 1963-65—Con.

Age and sex	6000 cps			8000 cps			Speech[2]		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-8.8	-2.6	+2.7	-13.0	-8.2	-1.8	-12.5	-9.2	-5.8
6 years	-8.1	-2.1	+3.0	-12.2	-7.3	-0.8	-11.9	-8.3	-4.5
7 years	-7.6	-1.7	+3.1	-12.4	-7.7	-1.5	-12.2	-8.5	-4.4
8 years	-9.3	-3.3	+1.9	-13.2	-8.1	-1.3	-12.6	-9.1	-5.6
9 years	-9.8	-4.0	+2.1	-13.8	-9.0	-3.2	-12.6	-9.4	-6.2
10 years	-8.6	-2.4	+2.8	-12.9	-7.9	-1.4	-12.7	-9.6	-6.5
11 years	-9.0	-2.7	+3.4	-13.7	-9.0	-3.4	-13.1	-9.9	-6.6
Boys									
6-11 years	-8.7	-2.5	+2.9	-12.9	-7.9	-1.4	-12.3	-9.0	-5.6
6 years	-8.3	-2.3	+2.9	-12.1	-6.7	-0.1	-11.8	-8.2	-3.8
7 years	-7.1	-1.8	+2.5	-12.5	-8.1	-2.4	-11.8	-8.0	-3.1
8 years	-9.2	-3.3	+2.0	-12.5	-7.4	-0.2	-12.4	-8.9	-5.4
9 years	-9.9	-4.3	+2.3	-13.6	-8.9	-3.2	-12.4	-9.4	-6.4
10 years	-8.3	-1.9	+3.5	-12.9	-7.6	-0.6	-12.4	-9.2	-6.0
11 years	-8.7	-2.1	+4.0	-13.4	-8.7	-2.7	-13.0	-9.8	-6.7
Girls									
6-11 years	-9.0	-2.7	+2.6	-13.2	-8.4	-2.3	-12.7	-9.4	-6.0
6 years	-7.9	-2.0	+3.0	-12.4	-7.9	-1.8	-11.9	-8.5	-5.1
7 years	-8.0	-1.6	+3.8	-12.3	-7.3	-0.9	-12.5	-8.9	-5.3
8 years	-7.3	-3.2	+1.8	-14.0	-8.8	-2.5	-12.8	-9.4	-5.9
9 years	-9.8	-3.8	+2.0	-13.9	-9.1	-3.1	-12.9	-9.4	-6.0
10 years	-9.0	-2.8	+2.1	-12.8	-8.1	-2.2	-13.0	-10.0	-7.0
11 years	-9.4	-3.2	+2.8	-13.9	-9.3	-4.2	-13.2	-9.9	-6.5

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children respectively fall.

[2] Average of hearing levels at 500, 1000, and 2000 cps.

Table 7. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among children in the South, by age and sex: United States, 1963-65

Age and sex	250 cps			500 cps			1000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-12.9	-9.3	-5.7	-12.6	-8.7	-4.6	-12.0	-8.1	-3.0
6 years	-11.8	-7.9	-2.7	-11.5	-7.3	-1.4	-11.3	-7.1	-0.9
7 years	-12.5	-8.6	-4.3	-11.9	-7.7	-2.2	-11.6	-7.5	-1.7
8 years	-12.9	-9.5	-6.2	-12.7	-8.8	-5.0	-12.0	-7.9	-2.3
9 years	-13.3	-9.6	-6.0	-12.9	-9.2	-5.5	-12.0	-8.3	-3.7
10 years	-13.2	-9.7	-6.3	-13.0	-9.3	-5.7	-12.2	-8.5	-4.3
11 years	-13.9	-10.3	-6.7	-13.3	-9.7	-6.2	-12.7	-9.2	-5.6
Boys									
6-11 years	-13.2	-9.5	-5.9	-12.7	-8.7	-4.6	-12.0	-8.2	-3.3
6 years	-11.9	-7.9	-2.8	-11.6	-7.3	-1.2	-11.3	-7.1	-0.7
7 years	-12.8	-8.9	-5.0	-12.1	-7.5	-1.7	-11.8	-7.6	-1.7
8 years	-13.0	-9.7	-6.4	-12.5	-8.7	-4.9	-12.0	-7.9	-2.5
9 years	-13.7	-10.0	-6.3	-12.9	-9.4	-5.8	-12.5	-8.9	-5.4
10 years	-13.8	-10.2	-6.6	-13.1	-9.4	-5.7	-11.9	-8.3	-5.5
11 years	-14.2	-10.7	-7.2	-13.7	-10.1	-6.5	-12.5	-9.2	-5.8
Girls									
6-11 years	-12.7	-9.1	-5.4	-12.5	-8.7	-4.7	-12.0	-8.0	-2.7
6 years	-11.7	-7.8	-2.5	-11.5	-7.3	-1.7	-11.3	-7.2	-1.2
7 years	-12.2	-8.3	-3.8	-11.7	-7.9	-2.8	-11.4	-7.3	-1.6
8 years	-12.7	-9.3	-5.9	-12.8	-8.9	-5.0	-12.1	-7.8	-2.1
9 years	-12.9	-9.3	-5.7	-12.9	-9.1	-5.3	-11.4	-7.4	-1.9
10 years	-12.8	-9.4	-6.0	-12.9	-9.3	-5.6	-12.5	-8.7	-4.4
11 years	-13.6	-10.0	-6.4	-13.0	-9.4	-5.9	-12.8	-9.1	-5.5

Age and sex	2000 cps			3000 cps			4000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-12.8	-9.1	-5.5	-10.0	-4.4	+1.0	-6.2	-1.2	+3.0
6 years	-12.4	-8.6	-4.3	-9.6	-4.0	+1.3	-4.8	-0.5	+3.7
7 years	-12.6	-9.0	-5.4	-10.0	-4.1	+1.1	-5.7	-1.0	+3.4
8 years	-12.9	-9.5	-6.0	-10.4	-5.3	+0.3	-5.0	-0.9	+3.2
9 years	-12.7	-9.0	-5.3	-9.3	-3.5	+1.6	-4.7	-0.6	+3.4
10 years	-13.1	-9.3	-5.5	-10.6	-5.5	+0.5	-8.1	-2.2	+2.8
11 years	-12.8	-9.4	-6.0	-10.0	-4.2	+1.1	-8.0	-2.2	+2.5
Boys									
6-16 years	-12.8	-9.1	-5.4	-9.7	-3.9	+1.2	-6.0	-1.0	+3.4
6 years	-12.5	-8.5	-4.1	-9.5	-3.9	+1.5	-4.7	-0.5	+3.7
7 years	-12.6	-8.8	-5.0	-9.0	-2.9	+1.8	-0.4	-0.5	+4.0
8 years	-12.5	-9.1	-5.8	-9.9	-4.4	+0.7	-5.5	-1.0	+3.1
9 years	-12.9	-9.3	-5.7	-9.9	-4.4	+1.1	-0.2	-0.8	+3.8
10 years	-13.1	-9.3	-5.6	-10.0	-4.7	+1.1	-7.0	-1.3	+3.5
11 years	-13.0	-9.5	-6.1	-9.6	-3.6	+1.2	-8.0	-2.3	+2.4
Girls									
6-11 years	-12.8	-9.1	-5.5	-10.2	-4.8	+0.8	-6.4	-1.3	+3.0
6 years	-12.4	-8.6	-4.6	-9.6	-4.1	+1.1	-4.9	-0.5	+3.9
7 years	-12.6	-9.2	-5.7	-10.6	-5.5	+0.3	-6.2	-1.3	+2.8
8 years	-13.5	-9.9	-6.3	-10.9	-6.2	-0.2	-4.7	-0.7	+3.3
9 years	-12.5	-8.7	-4.6	-8.5	-2.7	+1.9	-4.3	-0.5	+3.2
10 years	-13.2	-9.2	-5.3	-11.0	-6.0	0.0	-8.8	-2.9	+2.2
11 years	-12.7	-9.3	-5.9	-10.2	-4.8	+0.9	-7.9	-2.2	+2.6

Table 7. Median and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among children in the South, by age and sex: United States, 1963-65—Con.

Age and sex	6000 cps			8000 cps			Speech[2]		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-9.1	-2.6	+3.2	-11.6	-6.5	+0.3	-12.2	-8.7	-5.2
6 years	-8.8	-2.5	+3.4	-11.0	-5.2	+1.3	-10.6	-7.9	-3.0
7 years	-9.3	-2.7	+3.4	-11.2	-5.7	+0.8	-12.0	-8.1	-3.4
8 years	-9.6	-3.2	+2.3	-12.0	-7.6	-1.3	-12.3	-8.9	-5.5
9 years	-8.7	-2.2	+3.5	-11.8	-6.7	+0.6	-12.1	-8.8	-5.4
10 years	-9.2	-2.7	+3.0	-11.7	-6.9	-0.3	-12.4	-9.0	-5.6
11 years	-9.3	-2.7	+3.2	-11.7	-7.0	0.0	-12.6	-9.4	-6.1
Boys									
6-11 years	-9.3	-2.8	+3.3	-11.3	-6.2	+0.6	-12.3	-8.8	-5.3
6 years	-8.5	-2.0	+4.2	-9.9	-4.0	+2.0	-11.6	-7.9	-2.7
7 years	-9.6	-3.1	+4.1	-10.9	-5.2	+1.4	-12.1	-8.2	-3.5
8 years	-9.7	-3.4	+2.6	-11.8	-7.3	-1.1	-12.2	-8.8	-5.3
9 years	-9.3	-2.9	+2.8	-11.7	-7.0	-0.1	-12.5	-9.1	-5.8
10 years	-9.0	-2.8	+2.8	-11.6	-6.7	-0.1	-12.5	-9.1	-5.6
11 years	-9.4	-2.6	+3.6	-11.5	-6.7	+0.6	-12.9	-9.7	-6.5
Girls									
6-11 years	-9.0	-2.5	+3.0	-11.9	-6.9	0.0	-12.1	-8.6	-5.1
6 years	-9.0	-3.0	+2.7	-12.2	-6.6	+0.2	-11.9	-8.1	-3.2
7 years	-8.8	-2.3	+2.9	-11.4	-6.0	+0.3	-11.8	-8.0	-3.3
8 years	-9.4	-3.0	+2.0	-12.3	-7.8	-1.5	-12.3	-9.0	-5.6
9 years	-7.9	-1.4	+4.2	-11.9	-6.4	-1.2	-11.8	-8.4	-5.0
10 years	-9.3	-2.7	+3.2	-11.7	-7.1	-0.5	-12.4	-9.0	-5.6
11 years	-9.1	-2.7	+2.9	-11.8	-7.1	-0.4	-12.4	-9.1	-5.8

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children respectively fall.

[2] Average of hearing levels at 500,1000, and 2000 cps.

Table 8. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among children in the West, by age and sex: United States, 1963-65

Age and sex	250 cps			500 cps			1000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-15.6	-11.0	-6.7	-14.5	-10.2	-5.9	-13.7	-9.5	-5.3
6 years	-13.2	-9.1	-5.0	-12.7	-8.7	-4.3	-12.6	-8.4	-3.0
7 years	-14.1	-10.1	-6.1	-13.1	-9.2	-5.3	-13.0	-8.8	-3.9
8 years	-15.3	-10.8	-6.5	-14.5	-9.8	-5.1	-13.2	-9.3	-5.3
9 years	-16.2	-11.1	-6.7	-15.3	-10.3	-5.4	-14.4	-9.9	-5.4
10 years	-18.8	-13.0	-8.4	-17.4	-12.0	-7.6	-15.1	-10.9	-6.7
11 years	-17.7	-12.1	-7.6	-16.6	-11.5	-7.2	-14.1	-9.9	-5.6
Boys									
6-11 years	-16.6	-11.4	-7.0	-14.5	-10.0	-5.5	-13.5	-9.4	-5.2
6 years	-13.4	-9.2	-4.7	-12.7	-8.1	-2.3	-12.2	-7.9	-2.0
7 years	-14.3	-10.4	-6.5	-12.7	-9.0	-5.3	-13.1	-8.4	-2.5
8 years	-16.4	-11.2	-6.7	-14.2	-9.0	-2.9	-13.4	-9.4	-5.4
9 years	-17.5	-11.8	-7.2	-16.5	-10.8	-5.7	-14.6	-10.2	-5.8
10 years	-18.9	-13.2	-8.7	-16.3	-11.5	-7.3	-14.3	-10.4	-6.5
11 years	-18.9	-13.3	-8.5	-17.3	-11.9	-7.5	-13.7	-9.9	-6.0
Girls									
6-11 years	-14.7	-10.5	-6.3	-14.5	-10.4	-6.2	-13.8	-9.6	-5.3
6 years	-13.1	-9.1	-5.2	-12.7	-9.2	-5.6	-13.0	-8.8	-4.1
7 years	-13.9	-9.8	-5.6	-13.7	-9.5	-5.3	-12.9	-9.2	-5.5
8 years	-14.5	-10.4	-6.4	-14.8	-10.6	-6.3	-13.1	-9.2	-5.3
9 years	-14.6	-10.4	-6.1	-14.4	-9.7	-5.0	-14.1	-9.5	-4.7
10 years	-18.7	-12.9	-8.1	-18.2	-12.6	-8.0	-16.7	-11.4	-6.9
11 years	-15.1	-10.9	-6.7	-15.4	-11.0	-6.9	-14.7	-9.8	-4.9

Age and sex	2000 cps			3000 cps			4000 cps		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-14.3	-10.3	-6.3	-11.4	-6.2	0.0	-8.6	-2.6	+2.5
6 years	-13.1	-9.2	-5.3	-10.1	-4.2	+0.9	-6.8	-1.2	+3.6
7 years	-13.7	-9.9	-6.2	-10.4	-4.9	+0.6	-6.9	-1.5	+2.9
8 years	-14.1	-10.1	-6.2	-11.7	-6.2	+0.3	-8.1	-2.1	+2.6
9 years	-16.0	-11.2	-7.0	-12.2	-7.8	-1.8	-9.2	-3.1	+2.1
10 years	-15.5	-11.2	-7.1	-12.2	-7.4	-1.2	-10.1	-4.8	+0.8
11 years	-14.8	-10.5	-6.2	-11.6	-6.3	+0.2	-9.4	-3.4	+2.5
Boys									
6-11 years	-14.1	-10.0	-6.0	-11.3	-6.0	+0.3	-8.4	-2.4	+2.5
6 years	-12.5	-8.5	-4.0	-9.7	-3.8	+1.4	-6.9	-1.0	+4.2
7 years	-13.4	-9.6	-5.8	-10.0	-4.2	+1.2	-6.2	-1.2	+3.2
8 years	-14.6	-10.3	-6.1	-11.5	-6.2	+0.4	-8.8	-2.6	+2.4
9 years	-16.6	-11.4	-7.0	-12.2	-8.0	-2.4	-9.0	-3.1	+1.8
10 years	-14.2	-10.6	-7.0	-12.1	-6.8	-0.6	-9.7	-4.3	+1.0
11 years	-14.6	-10.1	-5.5	-11.6	-6.5	0.0	-8.8	-3.0	+2.3
Girls									
6-11 years	-14.6	-10.6	-6.6	-11.6	-6.4	-0.3	-8.4	-2.4	+2.5
6 years	-13.7	-9.8	-6.0	-10.5	-4.6	+0.3	-6.7	-1.4	+3.1
7 years	-14.1	-10.4	-6.7	-11.0	-5.9	-0.3	-7.8	-2.0	+2.6
8 years	-13.7	-10.0	-6.3	-12.0	-6.1	+0.3	-7.1	-1.6	+2.9
9 years	-15.2	-11.0	-6.9	-12.1	-7.5	-1.3	-9.5	-3.1	+2.3
10 years	-17.4	-11.8	-7.3	-12.3	-7.9	-2.0	-10.4	-5.3	+0.7
11 years	-14.9	-11.0	-7.0	-11.5	-6.0	+0.3	-10.1	-4.1	+2.8

Table 8. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies and estimates for speech among children in the West, by age and sex: United States, 1963-65—Con.

Age and sex	6000 cps			8000 cps			Speech[2]		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-10.3	-4.1	+2.0	-12.3	-7.5	-1.0	-13.6	-9.9	-6.2
6 years	-8.6	-2.4	+2.9	-11.1	-6.0	+0.8	-12.5	-8.8	-5.1
7 years	-10.1	-3.9	+2.3	-11.7	-6.5	-0.1	-13.0	-9.3	-5.6
8 years	-10.4	-4.3	+2.1	-12.3	-7.6	-0.8	-13.4	-9.9	-6.3
9 years	-10.7	-4.6	+1.6	-12.9	-8.4	-2.5	-14.2	-10.3	-6.4
10 years	-11.3	-5.8	+0.7	-13.0	-9.0	-4.9	-14.8	-11.1	-7.4
11 years	-10.4	-4.2	+1.8	-12.6	-7.5	-0.9	-14.0	-10.2	-6.4
Boys									
6-11 years	-10.1	-3.8	+2.3	-12.2	-7.3	-0.6	-13.4	-9.6	-5.8
6 years	-8.1	-1.7	+3.8	-10.5	-4.3	+1.8	-12.2	-8.4	-3.8
7 years	-9.6	-3.4	+2.5	-11.7	-6.5	+0.2	-12.8	-8.9	-5.1
8 years	-10.2	-4.0	+2.5	-11.8	-7.1	+0.1	-13.4	-9.7	-6.0
9 years	-10.8	-4.4	+2.2	-13.4	-8.6	-2.6	-14.5	-10.3	-6.1
10 years	-11.6	-5.5	+0.5	-12.7	-8.9	-5.2	-13.8	-10.4	-7.0
11 years	-10.6	-4.2	+1.7	-12.5	-7.5	-0.9	-13.9	-10.1	-6.4
Girls									
6-11 years	-10.5	-4.5	+1.6	-12.4	-7.8	-1.6	-13.9	-10.2	-6.5
6 years	-9.0	-3.0	+2.1	-11.6	-7.1	-0.5	-12.7	-9.2	-5.7
7 years	-11.0	-4.6	+1.9	-11.7	-6.6	-0.4	-13.3	-9.7	-6.2
8 years	-10.8	-4.7	+1.7	-12.8	-8.0	-1.7	-13.4	-10.0	-6.6
9 years	-10.6	-4.7	+1.0	-12.5	-8.1	-2.4	-13.9	-10.3	-6.6
10 years	-11.1	-6.1	+0.8	-13.3	-9.0	-4.4	-16.9	-11.9	-7.9
11 years	-10.3	-4.2	+2.0	-12.8	-7.5	-0.9	-14.2	-10.3	-6.4

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children respectively fall.

[2] Average of hearing levels at 500, 1000, and 2000 cps.

Table 9. Mean hearing levels at eight frequencies and estimates for speech of children living in urban communities, by age and sex: United States, 1963-65

Age and sex	250 cps	500 cps	1000 cps	2000 cps	3000 cps	4000 cps	6000 cps	8000 cps	Speech[1]
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-9.5	-9.0	-7.8	-9.2	-5.2	-2.0	-2.6	-6.2	-8.6
6 years	-7.4	-7.2	-6.6	-8.2	-4.6	-1.2	-2.0	-4.6	-7.6
7 years	-8.2	-7.6	-6.9	-8.7	-4.3	-1.3	-2.2	-5.6	-7.7
8 years	-9.8	-9.1	-7.5	-9.3	-5.1	-1.9	-3.5	-6.7	-8.6
9 years	-9.8	-9.2	-8.0	-9.4	-5.0	-2.0	-2.7	-6.7	-8.9
10 years	-10.8	-10.4	-9.0	-9.8	-5.8	-3.0	-3.0	-6.6	-9.8
11 years	-11.1	-10.4	-9.1	-9.7	-5.6	-2.7	-2.5	-6.7	-9.6
Boys									
6-11 years	-9.8	-8.8	-7.6	-8.9	-4.8	-1.9	-2.4	-5.8	-8.4
6 years	-7.6	-7.0	-6.2	-7.9	-4.0	-1.0	-1.8	-3.8	-7.1
7 years	-8.6	-7.4	-6.5	-8.5	-4.0	-1.2	-2.0	-5.6	-7.4
8 years	-9.8	-8.4	-6.9	-9.0	-4.7	-1.9	-2.8	-6.0	-8.2
9 years	-10.4	-9.5	-8.3	-9.3	-5.2	-2.2	-2.7	-6.8	-9.1
10 years	-11.2	-10.2	-8.6	-9.5	-5.4	-2.5	-2.6	-6.3	-9.4
11 years	-11.5	-10.6	-8.9	-9.2	-5.2	-2.6	-2.1	-6.2	-9.6
Girls									
6-11 years	-9.2	-9.1	-8.1	-9.4	-5.5	-2.2	-2.9	-6.6	-8.9
6 years	-7.2	-7.4	-6.9	-8.6	-5.4	-1.5	-2.3	-5.4	-7.8
7 years	-7.9	-7.8	-7.2	-8.9	-4.9	-1.7	-2.4	-5.6	-8.0
8 years	-9.9	-9.8	-8.0	-9.7	-5.7	-1.9	-4.1	-7.5	-9.0
9 years	-9.1	-8.9	-7.6	-9.5	-4.9	-2.0	-2.6	-6.6	-8.7
10 years	-10.5	-10.7	-9.3	-10.1	-6.2	-3.6	-3.4	-6.9	-10.2
11 years	-10.7	-10.3	-9.3	-10.0	-6.0	-2.9	-2.8	-7.4	-9.9

[1]Average of hearing levels at 500, 1000, and 2000 cps.

Table 10. Mean hearing levels at eight frequencies and estimates for speech of children living in rural areas, by age and sex: United States, 1963-65

Age and sex	250 cps	500 cps	1000 cps	2000 cps	3000 cps	4000 cps	6000 cps	8000 cps	Speech[1]
	Decibels re audiometric zero (ASA-1951)								
Both sexes									
6-11 years	-9.3	-9.1	-8.0	-9.1	-5.4	-2.1	-2.4	-5.7	-8.7
6 years	-7.4	-7.5	-6.9	-8.3	-5.0	-1.4	-2.2	-4.0	-7.6
7 years	-8.0	-7.6	-7.2	-8.6	-4.9	-1.9	-2.0	-5.5	-7.7
8 years	-9.6	-9.5	-7.9	-9.2	-6.0	-2.6	-2.8	-6.3	-8.8
9 years	-9.8	-9.6	-8.3	-9.3	-5.1	-2.0	-2.0	-5.6	-9.1
10 years	-10.4	-10.6	-8.9	-9.6	-6.0	-2.8	-3.1	-6.9	-9.8
11 years	-10.3	-9.9	-8.7	-9.1	-5.0	-1.9	-1.8	-5.7	-9.3
Boys									
6-11 years	-9.6	-9.1	-7.9	-8.9	-5.1	-2.0	-2.0	-5.5	-8.6
6 years	-7.8	-7.3	-6.8	-8.1	-4.2	-1.4	-1.9	-3.1	-7.2
7 years	-8.3	-7.7	-7.1	-8.4	-4.4	-1.7	-1.8	-5.5	-7.6
8 years	-9.7	-9.0	-7.7	-8.9	-5.8	-2.7	-2.6	-5.7	-8.6
9 years	-10.3	-10.1	-8.7	-9.3	-5.3	-2.2	-1.8	-5.7	-9.3
10 years	-10.8	-10.5	-8.9	-9.5	-6.1	-2.3	-2.6	-7.3	-9.7
11 years	-10.9	-10.4	-8.6	-9.2	-5.0	-2.0	-1.0	-5.8	-9.4
Girls									
6-11 years	-8.9	-9.1	-8.1	-9.2	-5.6	-2.2	-2.8	-6.0	-8.9
6 years	-7.0	-7.8	-7.1	-8.7	-5.9	-1.4	-2.7	-5.1	-8.0
7 years	-7.8	-7.6	-7.4	-8.9	-5.5	-2.3	-2.4	-5.6	-8.0
8 years	-9.5	-10.0	-8.3	-9.7	-6.3	-2.7	-3.1	-7.1	-9.2
9 years	-9.4	-9.3	-8.2	-9.4	-5.1	-1.9	-2.4	-5.7	-9.0
10 years	-10.1	-10.7	-9.1	-9.9	-6.0	-3.3	-3.7	-6.7	-10.0
11 years	-9.8	-9.5	-8.9	-8.9	-5.0	-1.8	-2.6	-5.8	-9.3

[1]Average of hearing levels at 500, 1000, and 2000 cps.

Table 11. Mean hearing levels for speech (estimated)[1] of children living in urban communities, by size of place of residence, age, and sex: United States, 1963-65

Age and sex	Urbanized areas				Urban places outside urbanized areas		
	3 million or more	1.0-2.9 million	250,000-999,999	Less than 250,000	25,000 or more	10,000-25,000	2,500-9,999
	Decibels re audiometric zero (ASA-1951)						
Both sexes							
6-11 years	-8.5	-8.7	-8.4	-8.5	-8.3	-8.6	-9.4
6 years	-7.1	-7.0	-6.8	-7.7	-6.8	-7.1	-7.8
7 years	-7.4	-7.4	-6.9	-7.2	-8.5	-8.1	-8.7
8 years	-8.7	-8.5	-7.4	-8.9	-6.7	-7.6	-9.5
9 years	-8.8	-9.4	-8.7	-7.7	-8.7	-7.4	-8.3
10 years	-9.3	-9.6	-9.6	-9.8	-8.3	-9.2	-11.1
11 years	-9.5	-10.1	-10.1	-8.9	-9.8	-10.5	-10.2
Boys							
6-11 years	-8.1	-8.8	-8.3	-8.2	-7.8	-8.7	-8.7
6 years	-6.9	-7.2	-6.3	-7.3	-7.9	-7.1	-6.8
7 years	-7.3	-6.7	-7.4	-7.3	-7.3	-8.2	-8.6
8 years	-8.3	-8.4	-6.0	-9.4	-6.2	-7.4	-9.4
9 years	-8.7	-9.7	-10.5	-7.3	-8.9	-8.3	-8.3
10 years	-9.1	-9.3	-9.5	-9.9	-7.4	-10.0	-9.7
11 years	-8.6	-11.1	-10.1	-8.4	-9.5	-10.8	-10.1
Girls							
6-11 years	-8.9	-8.7	-8.5	-8.8	-8.8	-8.5	-10.0
6 years	-7.6	-7.0	-7.4	-8.5	-6.6	-7.5	-9.4
7 years	-7.7	-8.3	-6.4	-7.5	-9.9	-8.6	-9.2
8 years	-9.2	-8.9	-9.1	-8.6	-7.8	-8.1	-9.8
9 years	-9.0	-9.0	-7.3	-8.5	-8.6	-7.1	-8.5
10 years	-9.8	-10.1	-9.9	-9.8	-10.5	-8.6	-12.2
11 years	-10.4	-9.1	-10.2	-9.8	-10.6	-10.8	-10.7

[1]Average of hearing levels at 500, 1000, and 2000 cps.

Table 12. Mean hearing levels at eight frequencies and estimates for speech[1] of children by rate of population change in place of residence from 1950 to 1960 and age: United States, 1963-65

Rate of population change and age	250 cps	500 cps	1000 cps	2000 cps	3000 cps	4000 cps	6000 cps	8000 cps	Speech[1]
	Decibels re audiometric zero (ASA-1951)								
Loss									
6-11 years	-9.8	-9.0	-8.2	-9.1	-4.9	-2.2	-2.4	-4.9	-8.7
6 years	-7.7	-7.1	-7.0	-8.2	-4.9	-1.5	-1.9	-8.9	-7.4
7 years	-8.2	-7.5	-7.4	-8.6	-4.4	-1.1	-2.2	-4.5	-7.8
8 years	-10.3	-9.1	-8.1	-9.5	-5.1	-2.1	-3.6	-5.7	-8.7
9 years	-10.2	-9.3	-7.9	-9.2	-4.5	-1.5	-1.4	-5.2	-8.7
10 years	-11.1	-10.6	-9.1	-9.6	-5.7	-2.4	-3.1	-5.6	-9.8
11 years	-10.9	-10.2	-9.6	-9.2	-4.6	-1.7	-1.7	-4.4	-9.8
Below-average gain									
6-11 years	-9.5	-8.5	-7.1	-9.0	-4.3	-1.4	-2.5	-6.3	-8.2
6 years	-7.2	-6.6	-5.6	-7.7	-4.0	-6.5	-2.1	-4.2	-6.7
7 years	-8.6	-7.6	-6.1	-8.9	-4.2	-1.1	-2.3	-5.6	-7.5
8 years	-10.0	-8.8	-6.8	-8.8	-4.2	-1.2	-3.1	-6.6	-8.2
9 years	-9.7	-8.2	-7.4	-9.1	-4.1	-1.5	-2.1	-6.9	-8.2
10 years	-10.7	-9.7	-8.2	-9.6	-4.5	-2.0	-2.6	-6.8	-9.2
11 years	-11.0	-10.3	-8.3	-9.5	-4.8	-2.3	-2.6	-7.4	-9.4
Average gain									
6-11 years	-8.9	-8.3	-7.1	-8.6	-4.2	-1.9	-1.8	-6.2	-8.0
6 years	-7.0	-6.6	-6.0	-8.0	-3.8	-0.6	-1.4	-4.6	-7.0
7 years	-7.9	-7.2	-6.6	-8.2	-3.9	-1.1	-1.7	-6.4	-7.3
8 years	-9.0	-8.1	-6.6	-8.5	-4.0	-1.3	-2.1	-6.6	-7.6
9 years	-9.1	-8.6	-7.2	-8.9	-4.0	-1.8	-2.5	-6.5	-8.2
10 years	-10.1	-9.4	-8.0	-8.8	-4.6	-2.7	-1.3	-6.3	-8.7
11 years	-10.7	-9.6	-8.3	-8.7	-4.7	-2.1	-1.4	-6.7	-8.8
Above-average gain									
6-11 years	-9.7	-10.1	-8.9	-10.0	-7.0	-3.5	-3.7	-7.0	-9.7
6 years	-7.6	-8.5	-7.8	-8.9	-5.9	-2.4	-2.6	-5.1	-8.4
7 years	-8.2	-8.1	-7.2	-9.0	-5.2	-2.2	-2.4	-5.5	-8.0
8 years	-9.9	-10.0	-7.9	-10.3	-7.6	-3.0	-4.4	-7.7	-9.6
9 years	-10.0	-10.8	-9.5	-10.3	-7.6	-3.3	-4.2	-7.6	-10.3
10 years	-11.2	-11.7	-10.3	-10.9	-8.2	-4.6	-4.6	-7.8	-11.0
11 years	-11.2	-11.2	-9.9	-10.5	-7.4	-4.1	-3.6	-7.9	-10.6

[1]Average of hearing levels at 500, 1000, and 2000 cps.

Table 13. Mean hearing levels for speech (estimated)[1] and at 2000, 4000, and 8000 cycles per second for children, by annual family income and age: United States, 1963-65

Frequency and age	Less than $3,000	$3,000-$4,999	$5,000-$6,999	$7,000-$9,999	$10,000-$14,999	$15,000 or more
	Decibels re audiometric zero (ASA-1951)					
Speech[1]						
6-11 years	-7.7	-8.1	-8.6	-9.2	-9.3	-10.4
6 years	-6.4	-6.6	-7.7	-7.7	-7.6	-8.9
7 years	-7.4	-7.3	-8.3	-7.5	-7.5	-7.2
8 years	-7.5	-8.5	-8.0	-9.4	-8.7	-9.7
9 years	-7.4	-8.4	-8.8	-9.6	-10.0	-11.3
10 years	-8.3	-9.0	-9.7	-10.0	-10.9	-12.1
11 years	-8.9	-8.8	-8.9	-10.6	-10.5	-11.9
2000 cps						
6-11 years	-8.0	-8.8	-9.1	-9.7	-10.1	-10.5
6 years	-7.7	-7.7	-8.1	-8.4	-9.3	-8.9
7 years	-8.1	-8.8	-9.1	-8.5	-9.5	-7.0
8 years	-7.9	-9.5	-9.1	-9.7	-9.6	-10.7
9 years	-7.6	-9.1	-9.2	-10.7	-9.6	-11.9
10 years	-8.3	-8.9	-9.7	-10.3	-11.1	-12.3
11 years	-8.2	-8.7	-9.1	-10.3	-10.6	-11.0
4000 cps						
6-11 years	-0.7	-1.2	-2.1	-2.7	-3.6	-3.6
6 years	-0.1	-0.1	-1.3	-2.1	-2.2	-2.3
7 years	-0.8	-1.2	-1.3	-1.8	-2.8	-0.2
8 years	-0.6	-0.8	-2.0	-2.6	-3.2	-3.0
9 years	-0.1	-1.4	-2.6	-2.6	-3.6	-5.2
10 years	-1.2	-1.5	-3.2	-3.4	-5.0	-4.6
11 years	-1.3	-1.6	-1.9	-3.3	-3.8	-4.6
8000 cps						
6-11 years	-5.4	-5.6	-5.9	-6.5	-6.9	-7.2
6 years	-8.9	-3.5	-4.8	-5.3	-4.6	-4.0
7 years	-5.0	-6.0	-5.5	-5.0	-6.8	-5.9
8 years	-6.4	-5.6	-6.3	-2.1	-7.2	-7.4
9 years	-5.1	-6.7	-5.8	-7.4	-7.5	-9.2
10 years	-5.6	-5.7	-6.3	-7.1	-7.8	-8.0
11 years	-6.4	-3.0	-6.2	-7.0	-7.0	-7.7

[1] Average of hearing levels at 500, 1000, and 2000 cps.

Table 14. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies among children, by annual family income and age: United States, 1963-65

Frequency and age	Less than $3,000			$3,000-$4,999		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA, 1951)					
250 cps						
6 years	-11.8	-7.4	-1.5	-12.4	-8.6	-4.4
7 years	-12.7	-8.8	-4.8	-12.5	-8.6	-4.0
8 years	-13.3	-9.6	-5.9	-13.4	-9.6	-5.9
9 years	-13.2	-9.6	-6.1	-14.0	-10.1	-6.2
10 years	-14.2	-10.0	-5.8	-14.4	-10.6	-6.6
11 years	-14.0	-10.4	-7.0	-13.8	-10.2	-6.4
500 cps						
6 years	-11.5	-7.2	-1.4	-12.1	-7.9	-2.4
7 years	-12.2	-8.2	-3.2	-11.9	-7.6	-1.8
8 years	-13.0	-8.6	-3.5	-13.4	-9.2	-4.6
9 years	-13.2	-9.4	-5.5	-13.2	-9.2	-4.8
10 years	-13.4	-9.4	-5.6	-14.1	-9.8	-5.6
11 years	-13.6	-9.9	-6.2	-13.6	-10.0	-6.2
1000 cps						
6 years	-11.1	-6.8	-0.6	-11.6	-7.3	-1.4
7 years	-12.2	-8.0	-1.7	-11.9	-7.4	-2.1
8 years	-12.0	-7.8	-2.2	-12.4	-8.0	-2.0
9 years	-12.1	-7.8	-2.0	-12.5	-8.6	-3.8
10 years	-12.6	-8.8	-4.4	-12.6	-8.8	-4.7
11 years	-12.6	-9.0	-5.0	-12.8	-9.0	-4.8
2000 cps						
6 years	-12.1	-8.0	-3.0	-12.4	-8.3	-3.2
7 years	-12.4	-8.6	-4.4	-13.0	-9.2	-5.3
8 years	-12.8	-9.0	-4.6	-14.0	-10.1	-6.2
9 years	-12.4	-8.7	-5.0	-13.6	-9.6	-5.8
10 years	-13.0	-9.0	-4.7	-13.3	-9.3	-5.1
11 years	-13.0	-9.1	-5.3	-12.8	-9.4	-6.0
3000 cps						
6 years	-8.8	-3.0	+1.6	-10.0	-4.3	+1.2
7 years	-9.2	-3.7	+1.3	-10.1	-4.6	+0.8
8 years	-10.0	-4.0	+1.4	-10.2	-4.4	+0.9
9 years	-9.4	-3.6	+2.0	-10.4	-5.0	+0.6
10 years	-10.6	-5.2	+0.8	-10.7	-5.4	+0.3
11 years	-10.3	-5.0	+0.6	-10.1	-4.8	+0.8
4000 cps						
6 years	-4.2	-0.2	+3.8	-4.5	-0.2	+4.2
7 years	-6.0	-0.8	+3.8	-6.0	-1.1	+3.2
8 years	-4.8	-0.7	+3.5	-6.1	-1.0	+3.7
9 years	-4.3	-0.2	+3.8	-5.8	-1.2	+2.9
10 years	-7.2	-1.6	+3.0	-6.8	-1.6	+3.0
11 years	-6.6	-1.6	+2.9	-8.0	-1.8	+3.4
6000 cps						
6 years	-6.6	-0.8	+4.3	-7.9	-2.0	+3.1
7 years	-8.5	-2.0	+3.8	-8.2	-1.7	+3.8
8 years	-8.2	-1.9	+3.4	-9.8	-3.8	+2.0
9 years	-8.5	-2.0	+3.9	-8.3	-2.2	+3.0
10 years	-9.3	-2.9	+2.9	-8.6	-2.6	+3.0
11 years	-9.1	-2.4	+3.4	-9.3	-2.6	+3.8
8000 cps						
6 years	-10.4	-4.6	+1.1	-11.0	-5.4	+2.0
7 years	-10.6	-4.8	+1.0	-12.0	-6.8	-0.5
8 years	-12.4	-8.0	-1.5	-11.4	-6.4	0.0
9 years	-12.1	-7.0	+0.4	-12.5	-7.7	-1.1
10 years	-11.6	-6.7	-0.3	-11.9	-7.4	-1.0
11 years	-12.0	-7.0	-0.4	-12.2	-6.8	+0.2

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children, respectively, fall.

Table 14. Medians and quartile points[1] in the distribution of hearing levels at eight frequencies among children, by annual family income and age: United States, 1963-65—Con.

$5,000-$6,999			$7,000-$9,999			$10,000-$14,999			$15,000 or more		
P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
Decibels re audiometric zero (ASA, 1951)											
-12.6	-8.5	-3.8	-12.4	-8.8	-5.3	-11.4	-8.6	-4.2	-12.6	-8.8	-5.0
-12.8	-9.0	-5.0	-12.6	-9.0	-5.4	-12.8	-9.2	-5.5	-13.0	-9.6	-6.2
-13.4	-9.8	-6.2	-14.4	-10.6	-6.8	-14.0	-10.1	-6.2	-13.5	-9.4	-4.8
-14.0	-10.2	-6.4	-14.2	-10.2	-6.2	-13.8	-10.2	-6.6	-16.0	-11.4	-7.4
-14.1	-10.6	-7.2	-15.2	-11.2	-7.5	-15.2	-11.3	-7.6	-15.3	-11.5	-8.0
-14.4	-10.4	-6.2	-15.4	-11.4	-7.6	-15.2	-11.3	-7.6	-18.2	-12.8	-8.6
-12.4	-8.2	-2.8	-12.2	-8.4	-4.0	-12.4	-8.4	-3.6	-13.4	-9.2	-4.6
-12.9	-9.0	-4.8	-12.1	-8.4	-4.2	-12.2	-11.2	-2.1	-12.2	-8.6	-4.4
-13.2	-9.2	-4.6	-14.0	-10.3	-6.6	-13.3	-9.2	-4.8	-13.0	-8.8	-4.2
-14.0	-10.0	-6.0	-13.6	-9.7	-5.8	-13.8	-10.2	-6.6	-15.8	-11.4	-7.5
-14.0	-10.4	-6.8	-14.2	-10.6	-6.8	-15.8	-11.0	-6.8	-16.4	-13.0	-8.4
-13.6	-9.8	-6.1	-15.4	-11.2	-7.5	-14.4	-10.6	-7.0	-18.8	-13.4	-9.0
-12.2	-8.2	-3.1	-11.9	-8.0	-3.0	-12.6	-8.2	-2.5	-13.4	-9.4	-5.4
-12.5	-8.6	-4.5	-11.6	-7.5	-1.8	-12.4	-8.2	-2.2	-11.8	-7.0	-2.7
-12.4	-8.2	-2.8	-12.9	-9.4	-5.8	-12.2	-8.4	-3.6	-13.1	-9.0	-4.5
-13.1	-9.2	-5.0	-13.0	-9.1	-4.8	-13.1	-9.5	-6.0	-14.6	-10.6	-6.7
-13.2	-9.2	-4.8	-13.2	-9.6	-5.9	-14.0	-10.0	-5.9	-15.6	-11.4	-7.6
-13.0	-8.8	-4.2	-13.1	-9.8	-6.6	-13.8	-10.2	-6.6	-15.6	-11.4	-7.8
-13.0	-9.0	-4.5	-12.8	-9.2	-5.5	-13.6	-9.5	-5.4	-13.3	-9.4	-5.0
-13.0	-9.4	-5.9	-12.8	-9.0	-5.2	-14.0	-9.8	-5.8	-12.0	-8.0	-3.6
-13.2	-9.4	-5.6	-13.6	-10.0	-6.4	-14.0	-10.2	-6.3	-14.4	-10.6	-7.0
-13.8	-9.8	-5.8	-14.3	-10.5	-6.6	-13.3	-9.5	-5.7	-17.6	-12.4	-7.2
-13.6	-10.1	-6.6	-13.9	-10.2	-6.6	-15.3	-11.0	-7.0	-18.2	-12.4	-7.8
-13.8	-10.0	-6.2	-14.0	-10.4	-6.8	-14.1	-10.8	-7.4	-15.2	-11.1	-7.3
-11.0	-5.6	+0.4	-11.0	-6.2	-0.4	-11.0	-6.0	+0.2	-11.0	-7.0	-2.4
-11.2	-6.0	-0.1	-10.4	-5.0	0.4	-10.3	-4.8	+0.5	-8.4	-3.2	+1.6
-10.8	-5.3	+0.4	-12.0	-7.4	-1.2	-11.8	-6.8	-0.2	-11.8	-6.8	-1.6
-11.0	-5.4	+0.4	-11.6	-7.0	-1.0	-11.8	-6.9	-0.9	-11.6	-7.5	-2.4
-10.8	-5.7	0.0	-11.6	-7.2	-1.3	-12.5	-8.1	-2.9	-13.4	-8.2	-2.3
-10.8	-5.4	+0.4	-11.2	-6.2	-0.6	-12.0	-8.0	-3.4	-12.8	-8.4	-3.4
-6.5	-1.3	+3.2	-7.0	-1.8	+2.6	-7.8	-2.2	+2.4	-6.7	-2.0	+2.4
-7.0	-1.6	+2.9	-6.7	-1.6	+2.6	-8.7	-2.9	+2.0	-5.6	-1.4	-2.4
-7.1	-1.8	+2.6	-8.8	-2.8	+2.2	-9.5	-3.2	+2.0	-8.2	-2.8	+1.3
-9.0	-3.2	+2.0	-9.2	-3.1	+2.2	-9.6	-3.4	+2.2	-11.8	-7.0	-0.8
-9.2	-3.8	+1.6	-9.6	-4.2	+1.2	-10.6	-5.7	-0.2	-10.4	-5.3	+0.2
-8.8	-3.0	+2.4	-9.6	-4.0	+1.4	-10.4	-5.4	+0.7	-11.2	-6.4	-0.5
-9.4	-3.1	+2.6	-8.6	-2.7	+2.3	-9.2	-3.2	+2.6	-9.6	-4.4	+3.4
-8.8	-2.6	+2.8	-8.0	-1.8	+3.1	-10.4	-4.2	+1.2	-7.4	-3.4	+1.7
-10.1	-4.1	+1.9	-10.4	-4.2	+1.6	-10.3	-4.8	+1.0	-10.1	-3.8	+1.1
-9.6	-3.2	+2.7	-10.4	-4.6	+2.0	-10.4	-5.0	+1.3	-11.8	-7.7	-2.0
-8.7	-2.4	+2.8	-10.4	-4.0	+1.6	-10.4	-4.4	+1.4	-11.4	-6.4	+1.6
-9.1	-2.4	+3.7	-10.4	-3.8	+2.1	-9.4	-3.2	+2.0	-8.1	-2.3	+2.7
-11.5	-6.2	+0.3	-11.8	-6.4	-0.2	-11.6	-6.6	+0.3	-11.2	-5.8	+1.2
-11.6	-6.5	0.0	-11.8	-6.6	+0.2	-12.6	-7.8	-1.8	-12.1	-7.3	-2.3
-12.6	-7.3	-0.4	-12.9	-8.0	-1.8	-12.8	-8.1	-2.8	-12.8	-8.6	-3.1
-12.4	-7.2	-0.6	-13.4	-8.2	-2.0	-12.8	-8.2	-1.9	-15.7	-10.4	-5.4
-12.8	-7.5	-0.8	-12.4	-8.2	-2.5	-12.6	-8.8	-4.4	-13.6	-8.1	-1.0
-12.6	-8.0	-1.6	-12.9	-8.4	-2.4	-13.3	-8.1	-1.5	-13.2	-9.2	-4.8

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children, respectively, fall.

Table 15. Medians and quartile points[1] in the distribution of hearing levels for speech[2] among children, by annual family income, age, and sex: United States, 1963-65

Age and sex	Less than $3,000			$3,000-$4,999		
	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
	Decibels re audiometric zero (ASA-1951)					
Both sexes						
6-11 years	-12.3	-8.6	-4.8	-12.4	-8.7	-5.1
6 years	-11.6	-7.4	-2.2	-11.8	-7.8	-2.7
7 years	-12.2	-8.4	-3.8	-12.1	-8.0	-3.0
8 years	-12.4	-8.8	-5.0	-13.0	-9.2	-5.4
9 years	-12.2	-8.6	-4.8	-12.4	-9.0	-5.2
10 years	-12.7	-9.3	-5.8	-12.8	-9.2	-5.6
11 years	-12.7	-9.2	-5.6	-12.6	-9.4	-6.2
Boys						
6-11 years	-12.2	-8.5	-4.4	-12.4	-8.7	-5.1
6 years	-11.2	-6.8	-0.8	-11.5	-7.4	-1.8
7 years	-12.1	-8.4	-3.9	-11.9	-7.5	-2.1
8 years	-11.9	-8.3	-4.1	-13.0	-9.3	-5.5
9 years	-12.3	-8.6	-4.4	-12.7	-9.5	-6.3
10 years	-13.0	-9.6	-6.2	-12.3	-8.8	-5.3
11 years	-12.7	-9.2	-5.7	-12.7	-9.6	-6.5
Girls						
6-11 years	-12.3	-8.7	-5.0	-12.4	-8.7	-5.1
6 years	-11.9	-8.1	-3.5	-12.0	-8.2	-3.5
7 years	-12.3	-8.3	-3.7	-12.3	-8.4	-3.8
8 years	-12.8	-9.3	-5.8	-12.8	-9.0	-5.2
9 years	-11.9	-8.5	-5.1	-12.1	-8.4	-4.1
10 years	-12.5	-9.0	-5.4	-13.2	-9.5	-5.9
11 years	-12.7	-9.1	-5.4	-12.4	-9.1	-5.8

Table 15. Medians and quartile points[1] in the distribution of hearing levels for speech[2] among children, by annual family income, age, and sex: United States, 1963-65—Con.

$5,000-$6,999			$7,000-$9,999			$10,000-$14,999			$15,000 or more		
P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}	P_{25}	Median	P_{75}
Decibels re audiometric zero (ASA-1951)											
-12.8	-9.2	-5.6	-12.9	-9.5	-6.2	-13.0	-9.6	-6.1	-13.9	-10.3	-6.7
-12.2	-8.5	-4.4	-12.1	-8.8	-5.4	-12.6	-8.9	-5.2	-13.4	-9.5	-5.6
-12.7	-9.0	-5.4	-12.1	-8.6	-4.6	-12.4	-8.7	-4.8	-12.0	-7.8	-3.8
-12.8	-9.0	-5.0	-13.1	-9.8	-6.5	-12.4	-9.1	-5.8	-13.4	-10.0	-6.6
-13.2	-9.5	-5.8	-13.3	-9.8	-6.4	-13.3	-10.0	-6.8	-14.1	-10.8	-7.6
-13.3	-9.8	-6.4	-13.2	-10.0	-6.7	-14.2	-10.6	-7.0	-16.4	-11.8	-8.0
-13.0	-9.4	-5.7	-13.7	-10.4	-7.1	-13.4	-10.0	-6.7	-14.7	-11.3	-7.8
-12.6	-9.0	-5.4	-12.8	-9.4	-6.0	-12.9	-9.4	-5.9	-13.6	-9.9	-6.2
-12.3	-8.6	-4.8	-11.9	-8.6	-5.3	-12.1	-8.6	-5.2	-13.3	-9.4	-5.4
-12.6	-9.2	-5.8	-11.9	-8.3	-3.9	-12.6	-8.9	-5.1	-11.1	-5.7	-0.4
-12.3	-8.5	-4.0	-13.0	-9.7	-6.3	-12.3	-8.8	-5.3	-13.3	-9.8	-6.3
-12.8	-9.1	-5.4	-13.4	-9.9	-6.4	-13.2	-10.0	-6.9	-12.8	-9.8	-6.8
-12.9	-9.3	-5.7	-12.7	-9.5	-6.2	-14.0	-10.2	-6.4	-16.7	-12.0	-8.2
-12.9	-9.3	-5.8	-14.0	-10.6	-7.1	-13.1	-9.7	-6.3	-14.8	-11.6	-8.3
-13.1	-9.4	-5.8	-12.9	-9.6	-6.3	-13.2	-9.8	-6.4	-14.2	-10.7	-7.3
-12.2	-8.4	-4.1	-12.3	-8.9	-5.5	-13.1	-9.2	-5.3	-13.4	-9.6	-5.8
-12.7	-8.9	-5.0	-12.2	-8.7	-5.3	-12.2	-8.5	-4.5	-12.8	-10.0	-7.2
-13.2	-9.6	-6.1	-13.2	-9.9	-6.6	-12.5	-9.4	-6.3	-13.5	-10.2	-6.8
-13.5	-9.9	-6.3	-13.2	-9.7	-6.3	-13.4	-10.0	-6.7	-15.4	-11.8	-8.4
-13.7	-10.4	-7.1	-13.8	-10.5	-7.2	-14.5	-11.0	-7.5	-16.2	-11.7	-7.9
-13.2	-9.4	-5.6	-13.3	-10.2	-7.0	-13.6	-10.3	-7.1	-14.5	-11.0	-7.4

[1] P_{25}, median, and P_{75} are the points in the distribution of hearing levels below which 25, 50, and 75 percent of the children respectively fall.

[2] Average of hearing levels at 500, 1000, and 2000 cps.

Table 16. Mean hearing levels for speech (estimated) and at 2000, 4000, and 8000 cycles per second of children, by education of parent and age: United States, 1963-65

Frequency and age	Years of schooling completed[1]							
	Less than 5 years	5-7 years	8 years	9-11 years	12 years	13-15 years	16 years	17 years or more
	Decibels re audiometric zero (ASA-1951)							
Speech[2]								
6-11 years	-6.6	-8.1	-7.9	-8.3	-9.1	-9.4	-9.9	-9.9
6 years	-6.1	-7.0	-6.5	-6.9	-7.5	-8.3	-7.7	-8.7
7 years	-6.0	-7.3	-6.5	-7.3	-8.3	-8.0	-8.5	-7.6
8 years	-5.7	-7.5	-7.6	-8.1	-8.7	-9.6	-9.9	-10.2
9 years	-6.9	-8.6	-7.4	-8.2	-9.4	-9.2	-10.7	-9.8
10 years	-6.6	-8.1	-9.5	-9.5	-10.4	-11.1	-11.0	-10.2
11 years	-7.4	-9.1	-8.6	-9.3	-10.2	-9.8	-11.3	-11.2
2000 cps								
6-11 years	-7.2	-8.5	-8.0	-8.4	-9.2	-9.8	-9.8	-10.6
6 years	-6.7	-7.4	-8.0	-8.0	-8.1	-9.4	-8.3	-9.6
7 years	-7.2	-8.8	-7.7	-7.9	-9.2	-8.8	-9.7	-9.7
8 years	-6.4	-7.9	-8.2	-9.6	-9.4	-11.0	-10.4	-10.4
9 years	-7.9	-8.5	-7.6	-8.8	-10.2	-9.5	-11.2	-10.5
10 years	-6.6	-8.8	-9.8	-9.4	-10.2	-11.0	-10.9	-11.2
11 years	-7.6	-8.9	-8.4	-9.5	-10.0	-9.5	-10.3	-11.3
4000 cps								
6-11 years	-0.7	-0.7	-1.4	-1.5	-2.8	-3.3	-3.2	-3.8
6 years	+0.8	-0.6	-0.8	0.0	-1.9	-2.2	-2.0	-2.7
7 years	+1.5	-0.1	-0.8	-1.2	-1.9	-2.3	-2.4	-1.6
8 years	+1.6	+0.6	-1.4	-2.2	-2.2	-2.8	-2.5	-4.6
9 years	+0.5	-0.9	-0.8	-0.9	-2.8	-4.1	-4.2	-2.9
10 years	-0.2	-1.1	-2.2	-2.5	-4.0	-4.1	-3.1	-4.4
11 years	+1.3	-1.4	-1.4	-2.2	-3.7	-3.6	-4.0	-4.3
8000 cps								
6-11 years	-4.7	-5.8	-5.4	-5.7	-6.4	-6.9	-6.8	-7.3
6 years	-3.5	-4.5	-5.5	-3.7	-4.6	-4.5	-4.6	-5.2
7 years	-3.9	-4.4	-4.4	-5.7	-5.4	-7.3	-5.3	-7.1
8 years	-5.7	-6.0	-6.5	-5.7	-6.9	-8.1	-7.2	-3.3
9 years	-4.6	-5.5	-4.4	-5.9	-7.4	-7.7	-8.2	-7.7
10 years	-4.9	-6.3	-5.4	-6.7	-6.9	-7.4	-7.9	-7.5
11 years	-4.8	-5.9	-5.4	-6.4	-7.5	-5.5	-7.2	-7.9

[1] Father if he is in the home, if not the mother or guardian.

[2] Average of hearing levels at 500, 1000, and 2000 cps.

Table 17. Mean hearing levels at eight frequencies and estimates for speech of children 6-11 years of age, by grade in school: United States, 1963-65

Grade in school	250 cps	500 cps	1000 cps	2000 cps	3000 cps	4000 cps	6000 cps	8000 cps	Speech[1]
	Decibels re audiometric zero (ASA-1951)								
Kindergarten	-6.2	-6.0	-5.4	-7.2	-3.2	+0.2	-1.5	-3.4	-6.4
First grade	-7.6	-7.0	-6.4	-8.1	-4.3	-1.1	-2.0	-4.4	-7.2
Second grade	-8.6	-8.0	-7.1	-8.8	-4.6	-1.4	-2.3	-6.0	-8.0
Third grade	-9.7	-9.2	-7.8	-9.4	-5.2	-2.1	-3.4	-6.4	-8.7
Fourth grade	-10.2	-9.8	-8.5	-9.6	-5.4	-2.5	-3.0	-7.2	-9.4
Fifth grade	-10.8	-10.3	-8.7	-9.6	-5.7	-2.8	-2.6	-6.5	-9.5
Sixth grade	-11.3	-10.8	-9.7	-10.3	-6.2	-3.3	-3.0	-7.2	-10.4
Seventh grade	-11.8	-11.2	-10.5	-10.2	-6.2	-3.9	-2.4	-7.0	-10.5
Special ungraded class	-8.0	-6.9	-4.4	-6.0	-2.6	+0.8	+1.0	-2.2	-5.6

[1]Average of hearing levels at 500, 1000, and 2000 cps.

APPENDIX I

STATISTICAL NOTES

The Survey Design

The sample design for the second cycle of the Health Examination Survey, similar to the one used for the first cycle, was that of a multistage, stratified probability sample of loose clusters of persons in land-based segments. Successive elements dealt with in the process of sampling are primary sampling unit (PSU), census enumeration district (ED), segment, household, eligible child (EC), and finally, the sample child (SC).

At the first stage, the nearly 2,000 PSU's into which the United States (including Hawaii and Alaska) has been divided and then grouped into 357 strata for use in the Current Population Survey and the Health Interview Survey were further grouped into 40 super-strata for use in Cycle II of the Health Examination Survey. The average size of each Cycle II stratum was 4.5 million persons, and all strata fell between the limits of 3.5 and 5.5 million. Grouping into 40 strata was done in a way that maximized homogeneity of the PSU's included in each stratum, particularly with regard to degree of urbanization, geographic proximity, and degree of industrialization. The 40 strata were classified into four broad geographic regions (each with 10 strata) of approximately equal population and cross-classified into four broad population density groups (each having 10 strata). Each of the 16 cells contained either two or three strata. A single stratum might include only one PSU, only part of the PSU, (e.g., New York City, which represents two strata), or several score PSU's.

To take account of the possible effect that the rate of population change between the 1950 and 1960 Census might have had on health, the 10 strata within each region were further classified into four classes ranging from those with no increase to those with the greatest relative increase. Each such class contained either two or three strata.

One PSU was then selected from each of the 40 strata. A controlled selection technique was used in which the probability of selection of a particular PSU was proportional to its 1960 population. In the controlled selection an attempt was also made to maximize the spread of the PSU's among the States. While not every one of the 64 cells in the 4x4x4 grid contributes a PSU to the sample of 40 PSU's, the controlled selection technique ensured the sample's matching the marginal distributions in all three dimensions and being closely representative of all cross-classifications.

Generally, within a particular PSU, 20 ED's were selected with the probability of selection of a particular ED proportional to its population in the age group 5-9 years in the 1960 Census, which by 1963 roughly approximated the population in the target age group for Cycle II. A similar method was used for selecting one segment (cluster of households) in each ED. Each of the resultant 20 segments was either a bounded area or a cluster of households (or addresses). All of the children in the age range properly resident at the address visited were EC. Operational considerations made it necessary to reduce the number of prospective examinees at any one location to a maximum of 200. The EC to be excluded for this reason from the SC group were determined by systematic subsampling.

The total sample included 7,417 children from 25 different States in the age group 6-11 years with approximately 1,000 in each of the single years of age.

Reliability

Measurement processes employed in the survey were highly standardized and closely controlled. Of course this does not mean that the correspondence between the real world and the survey results is exact. Data from the survey are imperfect for three major reasons: (1) results are subject to sampling error, (2) the actual conduct of a survey never agrees perfectly with the design, and (3) the measurement processes themselves are inexact even though standardized and controlled.

The first report on Cycle II[4] describes in detail the faithfulness with which the sampling design was carried out. It notes that out of the 7,417 sample children the 7,119 who were examined—a response rate of 96 percent—gave evidence that they were a highly representative sample of children of this age in the noninstitutional population of the United States.

The response levels for the various demographic subgroups—including those for age, sex, race, region, population density, parent's educational level, and family income—show no marked differentials. Hence it appears unlikely that nonresponse could bias the findings much in these respects.

Measures used to control the quality of data from this survey in general and for the hearing tests specifically have been cited previously.

Data recorded for each sample child are inflated in the estimation process to characterize the larger universe of which the sample child is representative. The weights used in this inflation process are a product of the reciprocal of the probability of selecting the child, an adjustment for nonresponse cases, and a poststratified ratio adjustment which increases precision by bringing survey results into closer alignment with known U.S. population figures by color and sex within single years of age 6-11.

In the second cycle of the Health Examination Survey the sample was the result of three stages of selection—the single PSU from each stratum, the 20 segments from each sample PSU, and the sample children from the eligible children. The probability of selecting an individual child is the product of the probability of selection at each stage.

Since the strata are roughly equal in population size and a nearly equal number of sample children were examined in each of the sample PSU's, the sample design is essentially self-weighting with respect to the target population; that is, each child 6-11 years old had about the same probability of being drawn into the sample.

The adjustment upward for nonresponse is intended to minimize the impact of nonresponse on final estimates by imputing to nonrespondents the characteristics of "similar" respondents. Here "similar" respondents were judged to be examined children in a sample PSU having the same age (in years) and sex as children not examined in that sample PSU.

The poststratified ratio adjustment used in the second cycle achieved most of the gains in precision which would have been attained if the sample had been drawn from a population stratified by age, color, and sex and made the final sample estimates of population agree exactly with independent controls prepared by the Bureau of the Census for the noninstitutional population of the United States as of August 1, 1964 (approximate mid-survey point), by color and sex for each single year of age 6 through 11. The weight of every responding sample child in each of the 24 age, color, and sex classes is adjusted upward or downward so that the weighted total within the class equals the independent population control.

Sampling and Measurement Error

In the present report, reference has been made to efforts to minimize bias and variability of measurement techniques.

The probability design of the survey makes possible the calculation of sampling errors. The sampling error is used here to determine how imprecise the survey test results may be because they come from a sample rather than from the measurements of all elements in the universe.

The estimation of sampling errors for a study of the type of the Health Examination Survey is difficult for at least three reasons: (1) measurement error and "pure" sampling error are confounded in the data—it is not easy to find a procedure which will either completely include both or treat one or the other separately, (2) the survey design and estimation procedure are complex and accordingly require computationally involved techniques for the calculation of variances, and (3) from the survey are coming thousands of statistics, many for subclasses of the population for which there are a small number of cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error which may be large when the number of cases in a cell is small or even occasionally when the number of cases is substantial.

Estimates of approximate sampling variability for selected statistics used in this report are presented in table I. These estimates have been prepared by a replication technique which yields overall variability through observation of variability among random subsamples of the total sample. This method reflects both "pure" sampling variance and a part of the measurement variance. A similar replication technique was used to determine the sampling variability of the correlation coefficients shown in the Findings section.

In accordance with usual practice, the interval estimate for any statistic may be considered the range

Table I. Standard errors of estimates for average hearing levels for speech (estimated)[1] and total number of examinees, by selected characteristics: United States, 1963-65

Characteristic	Total number of examinees	Both sexes 6-11 years	Boys				Girls			
			6-11 years	6 years	9 years	11 years	6-11 years	6 years	9 years	11 years
Total number of examinees	...	7,119	3,632	575	603	628	3,487	536	581	564
		Standard error in dB re audiometric zero (ASA-1951)								
Race										
White	6,100	0.25	0.25	0.35	0.35	0.35	0.25	0.30	0.40	0.35
Negro	987	0.50	0.60	0.45	0.85	0.85	0.40	0.40	1.05	0.45
Other races	32	1.60	2.70	19.95	1.60	26.95	1.90	14.35	11.15	19.15
Region										
Northeast	1,782	0.50	0.55	0.75	1.00	0.55	0.50	0.65	0.85	0.60
Midwest	1,896	0.55	0.50	0.90	0.45	0.35	0.60	0.55	0.80	0.85
South	1,707	0.45	0.45	0.35	0.55	0.50	0.55	0.60	0.75	0.55
West	1,734	0.85	1.10	1.20	1.30	1.30	0.70	0.75	1.10	1.00
Urban area										
3 million or more	1,493	0.30	0.40	---	---	---	0.30	---	---	---
1-2.9 million	964	0.65	0.75	---	---	---	0.65	---	---	---
250,000-999,999	808	0.85	0.95	---	---	---	0.85	---	---	---
Under 250,000	572	1.20	1.10	---	---	---	1.40	---	---	---
25,000 or more	341	1.10	1.05	---	---	---	1.25	---	---	---
10,000-24,999	210	1.45	1.40	---	---	---	1.85	---	---	---
2,500-9,999	408	0.50	0.60	---	---	---	0.65	---	---	---
Rural area	2,323	0.40	0.40	---	---	---	0.40	---	---	---
Population change										
Loss	1,827	0.50	0.55	0.45	0.75	0.95	0.60	0.55	0.80	0.50
Below-average gain	1,688	0.70	0.85	0.80	1.25	0.85	0.70	0.80	0.90	1.00
Average gain	1,889	0.45	0.45	0.60	0.70	0.50	0.50	0.55	0.75	0.95
Above-average gain	1,715	0.50	0.50	0.35	0.80	0.60	0.60	0.80	0.65	0.55
Income										
Under $3,000	1,223	0.40	0.55	0.65	0.70	0.85	0.35	0.35	0.65	0.30
$3,000-$4,999	1,280	0.25	0.20	0.35	0.45	0.40	0.40	0.75	0.60	0.65
$5,000-$6,999	1,652	0.30	0.30	0.60	0.40	0.70	0.35	0.50	0.75	0.75
$7,000-$9,999	1,451	0.25	0.25	0.60	0.65	0.45	0.35	0.50	0.50	0.60
$10,000-$14,999	813	0.25	0.40	0.70	0.65	0.50	0.40	0.70	0.70	0.80
$15,000 or more	329	0.35	0.40	1.35	0.95	0.60	0.35	1.70	0.80	0.75
Education of parent										
Less than 5 years	472	0.65	0.85	---	---	---	0.75	---	---	---
5-7 years	656	0.45	0.60	---	---	---	0.40	---	---	---
8 years	787	0.35	0.30	---	---	---	0.50	---	---	---
9-11 years	1,466	0.25	0.25	---	---	---	0.25	---	---	---
12 years	2,192	0.25	0.25	---	---	---	0.30			
13-15 years	550	0.30	0.35	---	---	---	0.40	---	---	---
16 years	537	0.25	0.40	---	---	---	0.30	---	---	---
17 years or more	373	0.30	0.40	---	---	---	0.60	---	---	---
Grade in school										
Kindergarten	94	0.75	0.85	---	---	---	1.10	---	---	---
First	1,127	0.25	0.30	---	---	---	0.30	---	---	---
Second	1,258	0.25	0.30	---	---	---	0.35	---	---	---
Third	1,249	0.30	0.35	---	---	---	0.30	---	---	---
Fourth	1,208	0.35	0.40	---	---	---	0.35	---	---	---
Fifth	1,078	0.25	0.30	---	---	---	0.25	---	---	---
Sixth	791	0.30	0.40	---	---	---	0.30	---	---	---
Seventh	167	0.55	0.65	---	---	---	0.65	---	---	---
Special class	100	---	---	---	---	---	---	---	---	---

[1]Average of hearing levels at 500, 1000, and 2000 cps.

within one standard error of the tabulated statistic with 68-percent confidence, or the range within two standard errors of the tabulated statistic with 95-percent confidence. The latter is used as the level of significance in this report.

An approximation of the standard error of a difference $d = x - y$ or two statistics $\underline{x}$ and $\underline{y}$ is given by the formula $S_d = (S_x^2 + S_y^2)^{1/2}$ where S_x and S_y are the sampling errors, respectively of x and y shown in table I.

Small Categories

In some tables magnitudes are shown for cells for which the sample size is so small that the sampling error may be several times as great as the statistic itself. Obviously in such instances the statistic has no meaning in itself except to indicate that the true quantity is small. Such numbers, if shown, have been included in the belief that they may help to convey an impression of the overall story of the table.

———— ○ ○ ○ ————

APPENDIX II

DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES AND RELATED TERMS

Age.—The age recorded for each child was the age at last birthday on the date of examination. The age criterion for inclusion in the sample used in this survey was defined in terms of age at time of interview. Since the examination usually took place 2 to 4 weeks after the interview, some of those who were 11 years old at the time of interview became 12 years old by the time of examination. There were 72 such cases. In the adjustment and weighting procedures used to produce national estimates, these 72 were included in the 11-year-old group.

Race.—Race was recorded as "white," "Negro," or "other races." The last category included American Indians, Chinese, Japanese, and all races other than white or Negro. Mexican persons were included with "white" unless definitely known to be American Indian or of another race. Negroes and persons of mixed Negro and other parentage were recorded as "Negro."

Geographic region.—For purposes of stratification the United States was divided into four broad geographic regions of approximately equal population. These regions, which correspond closely to those used by the U.S. Bureau of the Census, were as follows:

Region	*States Included*
Northeast	Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania
Midwest	Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, and Missouri
South	Delaware, Maryland, District of Columbia, West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas
West	Washington, Oregon, California, Nevada, New Mexico, Arizona, Texas, Oklahoma, Kansas, Nebraska, North Dakota, South Dakota, Idaho, Utah, Colorado, Montana, Wyoming, Alaska, and Hawaii

Urban and rural areas.—The definition of urban and rural areas was the same as that used in the 1960 Census. According to this definition, the urban population was comprised of all persons living in (a) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New England, New York, and Wisconsin); (b) the densely settled urban fringe, whether incorporated or unincorporated, of urbanized areas; (c) towns in New England and townships in New Jersey and Pennsylvania which contained no incorporated municipalities as subdivisions and had either 2,500 inhabitants or more, or a population of 2,500 to 25,000 and a density of 1,500 persons or more per square mile; (d) counties in States other than the New England States, New Jersey, and Pennsylvania that had no incorporated municipalities within their boundaries and had a density of 1,500 persons or more per square mile; and (e) unincorporated places of 2,500 inhabitants or more not included in any urban fringe. The remaining population was classified as rural.

Urban areas are further classified by population size for places within urbanized areas and other urban places outside urbanized areas.

Grade in school.—The grade that the child attended at the time of interview was used here and later verified against school records. The grade of those children on summer vacation was considered to be the grade that they would enter when school resumed.

Education of parent or guardian.—The highest grade completed in school was recorded. The only grades counted were those attended in a regular public or private school where persons were given formal education, whether during the day or at night, and whether attendance was full or part time. A "regular" school is one which advances a person toward an elementary or high school diploma, or a college, university, or professional school degree. Education in vocational, trade, or business schools outside the regular school system was not counted in determining the highest grade of school completed.

Family income.—The income recorded was the total income of the past 12 months received by the head of the household and all other household members related to the head by blood, marriage, or adoption. This income was the gross cash income (excluding pay in kind) except in the case of a family with their own farm or business, in which case net income was recorded.

Parent.—A parent was the natural parent or, in the case of adoption, the legal parent of the child.

Guardian.—A guardian was responsible for the care and supervision of the child. He (or she) did not have to be the legal guardian to be considered the guardian for this survey. A guardianship could only exist when the parent(s) of the child did not reside within the sample household.

Head of household.—Only one person in each household was designated as the "head." He (or she) was the person who was regarded as the "head" by the members of the household. In most cases the head was the chief breadwinner of the family although this was not always true. In some cases the head was the parent of the chief earner or the only adult member of the household.

APPENDIX III

STANDARDS FOR REFERENCE (AUDIOMETRIC) ZERO

The sound pressure standards for "normal" auditory threshold—the 1951 American Standards Association audiometric zero—maintained by the National Bureau of Standards were derived from data of the National Health Survey of 1935-36, as described previously. The original measurements were determinations of voltages applied at the terminals of the audiometer earphones used in the survey for the subgroup of persons with "normal" hearing. These threshold data were transferred by loudness balancing to a group of standard earphones designed especially for stability in calibration—the Western Electric 705-A. After loudness balancing, the earphones were placed on an NBS 9-A standard calibrating coupler and their response was measured.

Later, and in a similar fashion, the National Bureau of Standards transferred the threshold from the Western Electric 705-A earphone to five other types of earphones.

The threshold standards in terms of sound pressure in a standard coupler will be valid for the earphones of these types provided the earphone cushions are of controlled profile, thickness, and compliance; the distance from the front of the face of the moving diaphragm to the plane of the cushion is held constant; and the earphone is held against the ear with a constant coupling force.[9,10] They will not apply to earphones of other types.

The transfer characteristics for the TDH-39 earphones used in this survey were determined through a scientifically designed and carefully controlled study on 12 human subjects done for the National Center for Health Statistics at the Acoustics Laboratory of the University of Pittsburgh.[11]

The new (1964) standard reference zero recommended by the International Organization for Standardization (ISO)[12-16] was adopted in the 1969 American National standard for audiometers after completion of this survey to replace the differing 1951 American and the 1954 British Standards.[17] Since these new standards are appearing in many of the journals and other technical publications, the comparison of them with the 1951 American Standard on the 705-A earphones and the TDH-39 earphones used in this survey is shown in table II.

The thresholds for the 1951 American Standard and the recommended ISO Standard on the 705-A earphones are rounded to the nearest 0.5 dB in accordance with the ISO method of presentation. The TDH-39 thresholds are retained in the form used to convert the findings from this survey to decibels re 0.0002 dyne per square centimeter for comparison with findings from other studies in which different instruments were used.

Table II. Comparison of 1951 American Standard and the recommended ISO Standard for reference zero

Frequency	1951 American Standard for reference zero of:		Recommended ISO Standard for reference zero of WE-705A earphones[1]
	WE-705A earphones[1]	TDH-39 earphones[1]	
	Decibels re 0.0002 dyne per square cm.		
250 cps	39.6	45.4	24.5
500 cps	25.0	30.0	11.0
1000 cps	16.5	22.6	6.5
2000 cps	17.0	21.8	8.5
3000 cps	[2]16.0	26.7	7.5
4000 cps	15.0	16.9	9.0
6000 cps	[2]17.5	23.9	8.0
8000 cps	20.9	26.5	9.5

[1]On NBS 9-A coupler. TDH-39 earphone reference values shown here are those determined for the Health Examination Survey instruments at the University of Pittsburgh.[11] The other two sets were determined by averaging many different determinations from many different countries available from the National Bureau of Standards

[2]Estimated.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1972 482-003/1

VITAL AND HEALTH STATISTICS PUBLICATION SERIES

Formerly Public Health Service Publication No. 1000

Series 1. Programs and collection procedures.—Reports which describe the general programs of the National Center for Health Statistics and its offices and divisions, data collection methods used, definitions, and other material necessary for understanding the data.

Series 2. Data evaluation and methods research.—Studies of new statistical methodology including: experimental tests of new survey methods, studies of vital statistics collection methods, new analytical techniques, objective evaluations of reliability of collected data, contributions to statistical theory.

Series 3. Analytical studies.—Reports presenting analytical or interpretive studies based on vital and health statistics, carrying the analysis further than the expository types of reports in the other series.

Series 4. Documents and committee reports.—Final reports of major committees concerned with vital and health statistics, and documents such as recommended model vital registration laws and revised birth and death certificates.

Series 10. Data from the Health Interview Survey.—Statistics on illness, accidental injuries, disability, use of hospital, medical, dental, and other services, and other health-related topics, based on data collected in a continuing national household interview survey.

Series 11. Data from the Health Examination Survey.—Data from direct examination, testing, and measurement of national samples of the civilian, noninstitutional population provide the basis for two types of reports: (1) estimates of the medically defined prevalence of specific diseases in the United States and the distributions of the population with respect to physical, physiological, and psychological characteristics; and (2) analysis of relationships among the various measurements without reference to an explicit finite universe of persons.

Series 12. Data from the Institutional Population Surveys —Statistics relating to the health characteristics of persons in institutions, and their medical, nursing, and personal care received, based on national samples of establishments providing these services and samples of the residents or patients.

Series 13. Data from the Hospital Discharge Survey.—Statistics relating to discharged patients in short-stay hospitals, based on a sample of patient records in a national sample of hospitals.

Series 14. Data on health resources: manpower and facilities.—Statistics on the numbers, geographic distribution, and characteristics of health resources including physicians, dentists, nurses, other health occupations, hospitals, nursing homes, and outpatient facilities.

Series 20. Data on mortality.—Various statistics on mortality other than as included in regular annual or monthly reports—special analyses by cause of death, age, and other demographic variables, also geographic and time series analyses.

Series 21. Data on natality, marriage, and divorce.—Various statistics on natality, marriage, and divorce other than as included in regular annual or monthly reports—special analyses by demographic variables, also geographic and time series analyses, studies of fertility.

Series 22. Data from the National Natality and Mortality Surveys.—Statistics on characteristics of births and deaths not available from the vital records, based on sample surveys stemming from these records, including such topics as mortality by socioeconomic class, hospital experience in the last year of life, medical care during pregnancy, health insurance coverage, etc.

For a list of titles of reports published in these series, write to:

Office of Information
National Center for Health Statistics
Public Health Service, HSMHA
Rockville, Md. 20852

DHEW Publication No. (HSM) 72-1025

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Public Health Service

HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION

5600 Fishers Lane
Rockville, Maryland 20852

OFFICIAL BUSINESS
Penalty for Private Use, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF H.E.W